MONTHLY WEATHER REVIEW.

Editor: Prof. CLEVELAND ABBE.

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INTRODUCTION.

The REVIEW for October, 1896, is based on 2,735 reports from stations occupied by regular and voluntary observers, classified as follows: 140 from Weather Bureau stations; 33 from U. S. Army post surgeons; 2,421 from voluntary observers; 33 from Canadian stations; 1 from Hawaii; 96 received through the Southern Pacific Railway Company; 14 from U. S. Life-Saving stations. International simultaneous observations are received from a few stations and used together with trustworthy newspaper extracts and special reports.

The WEATHER REVIEW is prepared under the general editorial supervision of Prof. Cleveland Abbe. Unless otherwise specifically noted, the text is written by the Editor, but the statistical tables are furnished by Mr. A. J. Henry, Chief of the Division of Records and Meteorological Data. Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada, Mr. Curtis J. Lyons, Meteorologist to the Government Survey, Honolulu, and of Dr. Mariano Bárcena, Director of the Central Meteorological Observatory of Mexico.

CLIMATOLOGY OF THE MONTH.

GENERAL CHARACTERISTICS.

The principal storm of the month was the hurricane that moved slowly northward from the West Indies on the 9th to the coast of New England on the 15th, but which was not felt severely at any interior land stations. Another interesting storm passed from the west Gulf States on October 23, rapidly northeastward, attended by general rain. The storm that passed from Kansas, October 28, to Lake Superior, October 31, was the only one that brought high winds to the Lake Region. In general the month was rather above the average as to pleasant autumn weather. The temperature was decidedly below the average from the Rocky Mountains to the Atlantic Coast, although there were a few days on which high maximum temperatures occurred in the immediate Mississippi and Missouri valleys. Rainfall was below the normal in the South Atlantic and east Gulf States, and lower Lake Region, but above the average in the west Gulf States. The snowfall on the northern Slope and middle Plateau regions was above the normal for the month.

ATMOSPHERIC PRESSURE.

[In inches and hundredths.]

The distribution of mean atmospheric pressure reduced to sea level, as shown by mercurial barometers, not reduced to standard gravity, and as determined from observations taken daily at 8 a. m. and 8 p. m. (seventy-fifth meridian time), is shown by isobars on Chart IV. That portion of the reduction to standard gravity that depends on latitude is shown by the numbers printed on the right-hand border.

The *mean pressures* during the current month were high in the Middle Atlantic States, Manitoba, and the Dakotas. Pressures were low in the Pacific Coast States.

The highest pressures were: Lander, 30.13; Parkersburg and Lynchburg, 30.11; Cincinnati, Pittsburg, Knoxville, and Cheyenne, 30,10. The lowest were: Yuma, 29.83; Fresno, 29.91; Los Angeles, 29.92; Red Bluff and Prince Albert, 29.93; San Diego, 29.94.

As compared with the normal for October, the mean pressure was in excess over all the Canadian Provinces and the lower Lake Region. It was deficient in the Pacific Coast States.

The greatest excesses were: St. Johns, N. F., 0.18; Qu'Appelle, 0.10; Minnedosa, 0.09; Bismarck, 0.08; Father Point and Sydney, 0.07; Halifax, Chatham, and Williston, 0.06. The greatest deficits were: Roseburg, 0.09; Block Island, Yuma, and Red Bluff, 0.08; Fresno and Vicksburg, 0.07; Nantucket, Atlanta, and Los Angeles, 0.06.

As compared with the preceding month of September, the pressures reduced to sea level show a rise at all stations except the coast of Washington, and the coast of New England and the Canadian Provinces.

The greatest rises were: Minnedosa, 0.12; Idaho Falls, 1.11; Winnipeg and Winnemucca, 0.10; White River, Qu'Appelle, Lander and El Paso, 0.09. The greatest falls were: St. Johns, N. F., 0.10; Bermuda, 0.07; Yarmouth, 0.06; Halifax, 0.05.

AREAS OF HIGH AND LOW PRESSURE.

By Prof. H. A. HAZEN.

During the month the paths of ten high and nine low areas were sufficiently well marked to be traced upon Charts II and I at the end of this REVIEW. From p. m. of the 3d to a. m. of the 10th there was a subpermanent low area in western Arizona. The path of low No. IX could be followed for only twenty-four hours, and for this reason no data have been inserted for it. The principal characteristics of the movements of these highs and lows will be found in the table accompanying, and a few of the more important details are here given.

HIGHS.

There has been a rather remarkable tendency for highs to

disappear in the central portion of the country between the Rockies and the Mississippi Valley. Highs III, IV, V, IX, and X are in this category. Nos. I, II, VI, VII, and VIII reached the Atlantic. Highs II, IV, VIII, and X came from the Pacific Coast; III, VII, and IX from north of Montana, and I, V, and VI began in the central portion of the country. The general motion of the highs that crossed the country has been along the latitude of 35°, the temperature departures have been, in general, below the normal. This would seem to indicate that a tendency to higher temperature from southerly winds has been more than overcome by a radiation to clear skies.

LOWS.

Most of the storms of the month have been first seen to the north of Montana. Their paths have been along northerly latitudes, and they have disappeared in the Lake Region or else in the Gulf of St. Lawrence. The West India hurricane of October 9th to 17th was IV on Chart I. Its ocean path has been mapped by the Hydrographic Office. From the 13th to 16th this storm remained almost stationary off the middle Atlantic Coast. The highest winds were reported as follows: Cape Henry, 60 miles, p. m. of 10th and 11th. Block Island, 68, p. m., 11th; 73, a. m., 12th; 80, p. m., 12th. Boston, 52, p. m., 12th.

At 8 p. m. of 28th a storm was central off the north Pacific Coast and this marked a break in the rather uniform dry weather which had prevailed previously. During the preceding twenty-eight days rain (mostly light and sporadic) had occurred on only six days. During the nineteen days following, up to November 16, rain (oftentimes very heavy) fell on all but two of the days. The remarks by Mr. B. S. Pague, the official at Portland, Oreg., relative to this occurrence, are published on a later page of this REVIEW.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocities.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long W.	Length.	Duration.	Daily.	Hourly.
High areas.		°	°		°	°	*Miles.*	*Days.*	*Miles.*	*Miles.*
I	1, a. m.	45	90	5, p. m.	51	68	1,130	4.5	251	10.5
II	2, a. m.	42	135	13, a. m.	49	63	4,220	11.0	384	16.0
III	8, p. m.	51	118	11, a. m.	49	89	1,880	2.5	753	31.4
IV	11, a. m.	41	126	14, a. m.	40	96	1,890	3.0	630	26.2
V	14, a. m.	43	111	17, a. m.	51	105	910	3.0	304	12.7
VI	17, a. m.	41	101	21, a. m.	46	58	2,820	4.0	705	29.4
VII	19, a. m.	53	109	23, a. m.	38	72	2,540	4.0	636	26.1
VIII	20, p. m.	46	127	27, a. m.	39	78	4,640	6.5	714	29.8
IX	27, a. m.	53	106	29, p. m.	51	100	660	2.5	264	11.0
X	28, p. m.	37	125	31, p. m.	33	102	1,840	3.0	613	25.5
Sums							22,530	44.0	5,244	
Mean of 10 paths									524	21.9
Mean of 44 days									512	21.3
Low areas.										
I	2, a. m.	53	116	5, a. m.	47	87	2,000	3.0	667	28.6
II	5, p. m.	36	91	8, p. m.	50	62	1,680	3.0	563	23.5
III	8, a. m.	42	113	12, a. m.	36	85	1,990	4.0	498	20.7
IV	9, a. m.	27	77	17, a. m.	51	64	2,900	8.0	363	15.1
V	9, p. m.	54	119	11, p. m.	53	105	600	2.0	303	12.6
VI	13, p. m.	54	107	15, p. m.	46	78	1,460	2.0	732	30.5
VII	17, p. m.	51	117	22, a. m.	51	66	2,830	4.5	629	26.2
VIII	22, a. m.	47	90	25, a. m.	48	62	1,550	3.0	516	25.1
IX	22, p. m.	30	98	23, p. m.	34	96				
X	26, a. m.	44	120	31, p. m.	48	87	2,980	5.5	541	22.5
Sums							18,060	35.0	4,832	
Mean of 9 paths									537	24.4
Mean of 35 days									516	21.5

TEMPERATURE OF THE AIR.

[In degrees Fahrenheit.]

The mean temperature is given for each station in Table II, for voluntary observers. Both the mean temperatures and the departures from the normal are given in Table I for the regular stations of the Weather Bureau.

The *monthly mean temperatures* published in Table I, for the regular stations of the Weather Bureau, are the simple means of all the daily maxima and minima; for voluntary stations a variety of methods of computation is necessarily allowed, as shown by the notes appended to Table II.

The *regular diurnal period* in temperature is shown by the hourly means given in Table V for 29 stations selected out of 82 that maintain continuous thermograph records.

The *distribution of the observed monthly mean* temperature of the air over the United States and Canada is shown by the dotted isotherms on Chart IV; the lines are drawn over the Rocky Mountain Plateau region, although the temperatures have not been reduced to sea level, and the isotherms, therefore, relate to the average surface of the country occupied by our observers; such isotherms are controlled largely by the local topography, and should be drawn and studied in connection with a contour map.

The *highest mean temperatures* were: Key West, 79.8; Jupiter, 76.0; Yuma, 75.5; Tampa, 73.2; Port Eads, 72.9; Galveston, 71.4; Corpus Christi, 70.8. The lowest temperatures were: Moorhead, 41.1; Williston, 41.2; Duluth, 41.8; Sault Ste Marie, 41.9; Bismarck, 42.0. Among the Canadian stations the highest were: Sydney and Halifax, 49.2; Yarmouth, 48.6; St. Johns, N. F., 48.2; Charlottetown, 48.0. The lowest were: White River, 31.6; Minnedosa, 34.5; Prince Albert, 34.6; Qu' Appelle, 34.8; Winnipeg, 35.0.

As compared with the normal for October the mean temperature for the current month was in excess at most of the Rocky Mountain and Pacific Coast stations and also the Canadian Maritime Provinces. It was deficient throughout the intermediate country. The greatest excesses were: Red Bluff, 4.2; Salt Lake City, Sidney, and Halifax, 3.2; Winnemucca, 3.1; Yuma, 3.0. The greatest deficits were: Detroit and Pittsburg, 4.7; Sioux City, 4.6; White River, 4.4; Kittyhawk, 4.2; New York and Cleveland, 4.1.

Considered by districts the mean temperatures of the current month show departures from the normal as given in Table I. The greatest positive departures were: Middle Plateau, 2.4; northern Plateau, 1.4. The greatest negative departures were: Middle Atlantic, 3.0; lower Lake, 3.5.

The *years of highest and lowest mean temperatures* for October are shown in Table I of the REVIEW for October, 1894. The mean temperature for the current month was not the highest on record at any regular station of the Weather Bureau. It was the lowest on record only at Sioux City, 47.1.

The *maximum and minimum temperatures* of the current month are given in Table I. The highest maxima were: 102, Yuma (18th); 98, San Luis Obispo (2d) and Phœnix (6th); 94, Fresno (2d) and Red Bluff (5th); 92, Palestine (3d). The lowest maxima were: 59, Eastport (16th); 60, Tatoosh Island (frequently); 64, Northfield (30th); 65, Alpena (30th), Sault Ste. Marie and Marquette (4th); 66, Port Angeles (17th). The highest minima were: 71, Key West (16th); 58, Jupiter (16th), Port Eads (frequently), Galveston (8th); 56, Tampa (16th) and Corpus Christi (25th). The lowest minima were: 10, Williston (22) and Lander (29th); 13, Bismarck (20th) and Huron (22d); 15, Moorhead (21st); 16, Miles City (29th); 17, Havre (26th); 18, Pierre (20th); 19, Duluth (24th) and Idaho Falls (10th).

The *years of highest maximum and lowest minimum temperatures* are given in the last four columns of Table I of the current REVIEW. During the present month the maximum temperatures were the highest on record at: New Orleans, Little Rock, and Topeka, 91; Miles City, 86; Port Angeles, 66. The minimum temperatures were not the lowest on record at any station of the Weather Bureau.

The *greatest daily range of temperature and the data for com-*

puting the extreme and mean monthly ranges are given for each of the regular Weather Bureau stations in Table I. The largest values of the greatest daily ranges were: St. Luis Obispo, 52; Carson City, 50; Pierre, 49; Winnemucca and North Platte, 48; Idaho Falls, Miles City, and Huron, 47. The smallest values were: Key West, 10; Block Island and Tatoosh Island, 14; Woods Hole, 15; Nantucket, 17; Eastport and Jupiter, 19; Galveston, San Diego, and Astoria, 20.

Among the *extreme monthly ranges* the largest were: Williston, 72; Pierre, 71; Miles City, 70; Lander and Huron, 69; Havre, 68. The smallest values were: Key West, 17; Tatoosh Island, 18; Astoria, 25; Hatteras, 26; Corpus Christi, San Diego, and Fort Canby, 27.

The *accumulated monthly departures* from normal temperatures from January 1 to the end of the current month are given in the second column of the following table, and the average departures are given in the third column for comparison with the departures of current conditions of vegetation from the normal condition.

Districts.	Accumulated departures.		Districts.	Accumulated departures.	
	Total.	Average.		Total.	Average.
	°	°		°	°
Middle Atlantic	+ 1.7	+ 0.2	New England	− 1.7	− 0.2
South Atlantic	+ 9.8	+ 1.0	Florida Peninsula	−11.6	− 1.2
East Gulf	+ 2.2	+ 0.2			
West Gulf	+11.6	+ 1.2			
Ohio Valley and Tenn	+ 8.5	+ 0.8			
Lower Lake	+ 6.0	+ 0.6			
Upper Lake	+18.4	+ 1.8			
North Dakota	+ 3.1	+ 0.3			
Upper Mississippi	+17.0	+ 1.7			
Missouri Valley	+16.5	+ 1.6			
Northern Slope	+ 6.4	+ 0.6			
Middle Slope	+22.8	+ 2.3			
Abilene (southern Slope)	+22.8	+ 2.3			
Southern Plateau	+ 7.1	+ 0.7			
Middle Plateau	+ 3.2	+ 0.3			
Northern Plateau	+16.7	+ 1.7			
North Pacific	+ 2.2	+ 0.2			
Middle Pacific	+ 1.2	+ 0.1			
South Pacific	+ 3.8	+ 0.4			

MOISTURE.

The *quantity of moisture* in the atmosphere at any time may be expressed by the weight of the vapor coexisting with the air contained in a cubic foot of space, or by the tension or pressure of the vapor, or by the temperature of the dew-point. The mean dew-point for each station of the Weather Bureau, as deduced from observations made at 8 a. m. and 8 p. m., daily, is given in Table I.

The *rate of evaporation* from a special surface of water on muslin at any moment determines the temperature of the wet-bulb thermometer; an evaporometer may be so constructed as to give the *quantity* of water evaporated from a similar surface during any interval of time. Such an evaporometer, therefore, would sum up or integrate the effects of those influences that determine the temperature as given by the wet bulb; from this quantity the *average humidity of the air* during any given interval of time may be deduced.

Measurements of evaporation within the thermometer shelters are difficult to make so as to be intercomparable at temperatures above and below freezing, and they may be replaced by computations based on the wet-bulb temperatures. The absolute amount of evaporation from natural surfaces not protected from wind, rain, sunshine, and radiation, are being made at a few experimental stations and will be discussed in special contributions.

Sensible temperatures.—The sensation of temperature experienced by the human body and ordinarily attributed to the condition of the atmosphere depends not merely on the temperature of the air, but also on its dryness, on the velocity of the wind, and on the suddenness of atmospheric changes, all combined with the physiological condition of the observer. A satisfactory expression for the relation between atmospheric conditions and nervous sensations has not yet been obtained.

PRECIPITATION.

[In inches and hundredths.]

The *distribution of precipitation* for the current month, as determined by reports from about 2,500 stations, is exhibited on Chart III. The numerical details are given in Tables I, II, and III. The total precipitation for the current month was heaviest in Nova Scotia, and also from 6 to 8 inches in small isolated regions in Louisiana and Texas and on the coast of Washington. The larger values at regular stations were: Halifax, 15.3; Charlottetown, 10.4; Port Eads, 8.8; Sydney, 7.8; Eastport, 7.1; Quebec, 7.0.

Details as to *excessive precipitation* are given in Tables XII and XIII.

The *years of greatest and least precipitation* for October are given in the REVIEW for October, 1890. The precipitation for the current month was the greatest on record at: San Antonio, 6.04; Corpus Christi, 4.12. It was the least on record only at: Rochester, 0.58.

The *diurnal variation*, as shown by tables of hourly means of the total precipitation, deduced from self-registering gauges kept at the regular stations of the Weather Bureau, is not now tabulated.

The *current departures* from the normal precipitation are given in Table I, which shows that precipitation was in excess in the Canadian Maritime Provinces, the west Gulf and southern Plateau stations. It was generally deficient elsewhere. The large excesses were: Halifax, 9.6; Charlottetown, 5.9; Port Eads, 5.4; Pensacola and Sydney, 3.5; Quebec, 3.3. The large deficits were: Key West, 3.3; Jupiter, 3.2; Alpena, 3.0; Raleigh and Charleston, 2.8; Charlotte, 2.7.

The *average departure* for each district is given in Table I. By dividing each current precipitation by its respective normal the following corresponding percentages are obtained (precipitation is in excess when the percentage of the normal exceeds 100):

Above the normal: New England, 105; east Gulf, 151; west Gulf, 156; Missouri Valley, 125; middle Slope, 139; southern Slope (Abilene), 198; southern Plateau, 232; south Pacific, 267.

Below the normal: Middle Atlantic, 54; south Atlantic, 60; Florida Peninsula, 53; Ohio Valley and Tennessee, 60; lower Lake, 45; upper Lake, 73; North Dakota, 77; upper Mississippi, 89; northern Slope, 87; middle Plateau, 51; northern Plateau, 63; north Pacific, 82; middle Pacific, 81.

The *total accumulated monthly departures* from normal precipitation from January 1 to the end of the current month are given in the second column of the following table; the third column gives the ratio of the current accumulated precipitation to its normal value.

Districts.	Accumulated departures.	Accumulated precipitation.	Districts.	Accumulated departures.	Accumulated precipitation.
	Inches.	*Per ct.*		*Inches.*	*Per ct.*
Lower Lake	+ 1.90	106	New England	− 2.50	93
North Dakota	+ 1.20	107	Middle Atlantic	− 4.60	88
Upper Mississippi	+ 1.40	105	South Atlantic	−11.40	76
Missouri Valley	+ 0.70	102	Florida Peninsula	− 4.60	90
Northern Slope	+ 0.60	104	East Gulf	− 6.70	86
Southern Plateau	+ 1.50	121	West Gulf	− 8.10	78
Middle Plateau	+ 2.70	129	Ohio Valley and Tenn	− 3.30	93
North Pacific	+ 1.70	104	Upper Lakes	− 2.10	93
Middle Pacific	+ 2.40	111	Middle Slope	− 1.60	92
			Abilene (southern Slope)	− 3.40	85
			Northern Plateau	− 1.00	92
			South Pacific	− 1.30	85

SNOWFALL.

The total monthly snowfall at each station is given in Table II; its geographical distribution is shown on Chart V. This chart also shows the isotherm of minimum 32° and of minimum 40° for the air within the ordinary instrument shelter. The former isotherm is an approximate limit to possible snow, while the latter is an approximate southern limit to the regions that report frost on exposed localities.

The *depth of snow on the ground* at the end of the month is given in detail in Table II, and for the winter months is also shown on Chart VI. The condition of the snow on the ground and of the ice in the rivers on Monday of each week, is also shown on the weekly charts of the Climate and Crop Service, published by the Weather Bureau during December to March, inclusive.

Snowfalls of from 12 to 20 inches were reported for October in southwestern Nebraska, Colorado, and northern New Mexico; 6 to 12 inches in North and South Dakota; 6 to 14 inches in northern Michigan, and light snows or "traces" in New England, New York, Pennsylvania, Ohio, West Virginia, Indiana, Illinois, Wisconsin, Minnesota, Iowa, and Kansas, as also in the middle and northern Rocky Mountain Plateau Region.

HAIL.

The following are the dates on which hail fell in the respective States:

Arizona, 1, 2, 11, 12, 27. Arkansas, 20, 22. Colorado, 7, 8, 9. Illinois, 16, 18, 19, 29. Indiana, 17, 19. Iowa, 9, 28, 29. Kansas, 28. Louisiana, 20, 21. Minnesota, 8, 16. Missouri, 28. Nevada, 27. New Hampshire, 8. New Mexico, 4, 6, 7, 9, 12, 13, 21, 28. North Dakota, 27. Oklahoma, 27. Oregon, 31. Tennessee, 12. Texas, 19, 21, 28. Utah, 27, 28. Washington, 31.

SLEET.

The following are the dates on which sleet fell in the respective States:

Colorado, 29. Illinois, 17, 19. Indiana, 18. Iowa, 17, 30. Kansas, 23. Massachusetts, 17. Michigan, 6 to 9, 17, 18, 19, 23, 24. Minnesota, 30, 31. Montana, 9, 27. Nebraska, 5, 28, 29, 30. New Mexico, 27. New York, 7, 18, 19, 21, 22. North Dakota, 17, 26, 27. Pennsylvania, 18. South Dakota, 17, 28 to 31. Utah, 27, 28. Washington, 31. West Virginia, 17. Wisconsin, 16, 18, 19, 31.

WIND.

The *prevailing winds* for October, 1896, viz, those that were recorded most frequently, are shown in Table I for the regular Weather Bureau stations.

HIGH WINDS.

Maximum wind velocities of 50 miles or more per hour were reported during this month at regular stations of the Weather Bureau as follows (maximum velocities are averages for five minutes; extreme velocities are gusts of shorter duration, and are not given in this table):

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
		Miles				*Miles*	
Block Island, R. I	11	72	ne.	Fort Canby, Wash	29	60	s.
Do	12	78	ne.	Do	30	66	s.
Do	13	68	ne.	Hatteras, N. C	11	67	n.
Do	15	51	ne.	Kittyhawk, N. C	10	60	ne.
Boston, Mass	12	50	ne.	Do	11	72	ne.
Chicago, Ill	29	62	s.	Do	12	56	nw.
Do	30	51	sw.	Nantucket, Mass	11	50	ne.
Duluth, Minn	30	55	ne.	Do	12	60	ne.
Eastport, Me	24	58	s.	Tatoosh Island, Wash.	30	52	s.
El Paso, Tex	13	50	nw.	Winnemucca, Nev	31	50	sw.
Fort Canby, Wash	28	60	s.				

The *resultant winds*, as deduced from the personal observations made at 8 a. m. and 8 p. m., are given in Table IX. These latter resultants are also shown graphically on Chart IV, where the small figure attached to each arrow shows the number of hours that this resultant prevailed, on the assumption that each of the morning and evening observations represents one hour's duration of a uniform wind of average velocity. These figures indicate the relative extent to which winds from different directions counterbalanced each other.

SUNSHINE AND CLOUDINESS.

The quantity of sunshine, and therefore of heat, received by the atmosphere as a whole is very nearly constant from year to year, but the proportion received by the surface of the earth depends upon the absorption by the atmosphere, and varies largely with the distribution of cloudiness. The sunshine is now recorded automatically at 20 regular stations of the Weather Bureau by its photographic, and at 25 by its thermal effects. At one of these stations records are kept by both methods. The photographic record sheets show the apparent solar time, but the thermometric records show seventy-fifth meridian time; for convenience the results are all given in Table XI for each hour of local mean time.

Photographic and thermometric registers give the duration of that intensity of sunshine which suffices to make a record, and, therefore, they generally fail to record for a short time after sunrise and before sunset, because, even in a cloudless sky, the solar rays are then too feeble to affect the self-registers. If, therefore, such records are to be used for determining the amount of cloudiness, they must be supplemented by special observations of the sky near the sun at these times. The duration of clear sky thus specially determined constitutes the so-called twilight correction (more properly a low-sun correction), and when this has been applied, as has been done in preparing Table XI, there results a complete record of the clearness of the sky from sunrise to sunset in the neighborhood of the sun. The twilight correction is not needed when the self-registers are used for ascertaining the duration of a special intensity of sunshine, but is necessary when the duration of cloudiness is alone desired, as is usually the case.

The average cloudiness of the whole sky is determined by numerous personal observations at all stations during the daytime, and is given in the column "average cloudiness" in Table I; its complement, or percentage of clear sky, is given in the last column of Table XI.

COMPARISON OF DURATIONS AND AREAS.

The sunshine registers give the *durations* of effective sunshine whence the duration relative to possible sunshine is derived; the observer's personal estimates give the percentage of *area* of clear sky. These numbers have no necessary relation to each other, since stationary banks of clouds may obscure the sun without covering the sky, but when all clouds have a steady motion past the sun and are uniformly scattered over the sky, the percentages of duration and of area agree closely. For the sake of comparison, these percentages have been brought together, side by side, in the following table, from which it appears that, in general, the instrumental records of percentages of durations of sunshine are almost always larger than the observers' personal estimates of percentages of area of clear sky; the average excess for October, 1896, is 7 per cent for photographic and 5 per cent for thermometric records.

The details are shown in the following table, in which the stations are arranged according to the greatest possible duration of sunshine, and not according to the *observed* duration as heretofore.

Difference between instrumental and personal observations of sunshine.

Stations.	Apparatus.	Total possible duration for the whole month.	Personal estimated area of clear sky.	Instrumental record of sunshine.			
				Photographic.	Difference.	Thermometric.	Difference.
		H'rs.	%	%	%	%	%
Galveston, Tex.	P.	355.9	52	57	+ 5	.....	.....
New Orleans, La.	T.	354.9	37	.....	.....	39	+ 2
Savannah, Ga.	P.	352.8	58	63	+ 5	.....	.....
Vicksburg, Miss.	T.	352.8	58	.....	.....	61	+ 3
Phœnix, Ariz.	P.	351.5	73	81	+ 8	.....	.....
San Diego, Cal.	P.	351.5	69	69	0	.....	.....
Atlanta, Ga.	T.	350.9	58	.....	.....	55	− 3
Los Angeles, Cal.	P.	350.9	68	77	+ 9	.....	.....
Wilmington, N. C.	T.	350.9	57	.....	.....	65	+ 8
Little Rock, Ark.	T.	350.1	49	.....	.....	69	+20
Santa Fe, N. Mex.	P.	348.9	46	64	+18	.....	.....
Fresno, Cal.	T.	347.9	75	.....	.....	84	+ 9
Dodge City, Kans.	P.	347.3	64	72	+ 8	.....	.....
Louisville, Ky.	T.	347.3	64	.....	.....	74	+10
San Francisco, Cal.	T.	347.3	66	.....	.....	69	+ 3
Baltimore, Md.	T.	346.0	54	.....	.....	44	−10
Cincinnati, Ohio	T.	346.0	62	.....	.....	71	+ 9
Kansas City, Mo.	P.	346.0	69	74	+ 5	.....	.....
St. Louis, Mo.	T.	346.0	71	.....	.....	79	+ 8
Washington, D. C.	P.	346.0	54	57	+ 3	.....	.....
Columbus, Ohio.	T.	344.9	42	.....	.....	54	+12
Denver, Colo.	P.	344.9	59	70	+11	.....	.....
Philadelphia, Pa.	T.	344.9	39	.....	.....	47	+ 8
Cheyenne, Wyo.	P.	343.9	55	78	+23	.....	.....
Eureka, Cal.	P.	343.9	46	45	− 1	.....	.....
New York, N. Y.*	T.	343.9	35	.....	.....	34	− 1
Omaha, Nebr.	P.	343.9	56	65	+ 9	.....	.....
Salt Lake City, Utah.	P.	343.9	64	76	+12	.....	.....
Binghamton, N. Y.	T.	342.5	26	.....	.....	25	− 1
Boston, Mass.	T.	342.5	31	.....	.....	38	+ 7
Chicago, Ill.	T.	342.5	55	.....	.....	63	+ 5
Cleveland, Ohio	P.	342.5	52	.....	.....	.....	.....
Des Moines, Iowa.	T.	342.5	68	.....	.....	76	+ 8
Detroit, Mich.	T.	342.5	58	.....	.....	61	+ 3
Dubuque, Iowa†	T.	342.5	55	.....	.....	53	− 2
Buffalo, N. Y.	T.	341.8	35	.....	.....	44	+ 9
Rochester, N. Y.	T.	341.8	33	.....	.....	30	− 3
Northfield, Vt.	P.	340.5	26	36	+10	.....	.....
Portland, Me.	T.	340.5	25	.....	.....	33	+ 8
Eastport, Me.	P.	339.8	28	35	+ 7	.....	.....
Minneapolis, Minn.	T.	339.8	.....	.....	.....	61	.....
Portland, Oreg.*	T.	338.5	57	.....	.....	59	+ 2
	P.	338.5	57	56	− 1	.....	.....
Bismarck, N. Dak.	P.	336.7	60	59	− 1	.....	.....
Helena, Mont.	P.	336.7	59	67	+ 8	.....	.....

*The personal estimate is 36 for 31 days, but the instrumental record is for 27 days, for which the total possible was 301.8.

†The personal estimate is 56 for 31 days, but the instrumental record is for 26 days, for which the total possible was 284.3.

ATMOSPHERIC ELECTRICITY.

Numerical statistics relative to auroras and thunderstorms are given in Table X, which shows the number of stations from which meteorological reports were received, and the number of such stations reporting thunderstorms (T) and auroras (A) in each State and on each day of the month, respectively.

Thunderstorms.—The dates on which reports of thunderstorms for the whole country were most numerous were: 27th, 44; 28th, 114; 29th, 83.

Thunderstorm reports were most numerous in: Iowa and Missouri, 43; Louisiana, 46; Texas, 49.

Thunderstorms were most frequent in: Louisiana and Mississippi, 10 days: Arizona, 11; Missouri, 13; New Mexico, 17; Texas, 15.

Auroras.—The evenings on which bright moonlight must have interfered with observations of faint auroras are assumed to be the four preceding and following the date of full moon, viz, from the 16th to the 24th, inclusive. On the remaining twenty-two days of this month 101 reports were received, or an average of about 5 per day. The dates on which the number of reports especially exceeded this average were: 8th, 12; 9th, 20; 10th, 27; 11th, 9; 12th, 10.

Auroras were reported most frequently in: Illinois, Maine, New Hampshire, and North Dakota, 5 days; Massachusetts, 7; Montana, 6.

The number of reports was a large percentage of the number of observers in: Maine, 100; Montana, 32; New Hampshire, 48; North Dakota, 36 per cent.

CANADIAN REPORTS.

Thunderstorms were reported as follows: Grand Manan, 18th; Parry Sound, 29th; Swift Current, 5th; Banff, 2d.

Auroras were reported as follows: Sydney, 9th; Halifax, 9th; Grand Manan, 10th; Yarmouth, 9th; St. Andrews, 10th; Charlottetown, 12th; Father Point, 4th, 11th, 12th; Quebec, 9th to 12th; Port Arthur, 1st; Winnipeg, 8th, 10th, 12th to 15th, 29th; Minnedosa, 9th, 10th, 11th, 15th; Qu'Appelle, 13th, 14th, 15th; Medicine Hat, 8th, 9th, 12th, 13th, 29th; Calgary, 12th 13th, 15th; Prince Albert, 12th; Battleford, 11th, 12th.

INLAND NAVIGATION.

The *extreme and average stages of water* in the rivers for the current month are given in Table VIII. At no station, with a single exception, has the river approached the danger line. With the exception of the Ohio and Potomac there has been little range in the heights of rivers; these have remained steadily at a low stage. At the end of the previous month the Monongahela and other rivers of West Virginia were moderately full, and these waters caused a rise in the Ohio during the early part of October, the crest being reached at Cincinnati on the 6th and at Cairo on the 12th. The following rise in the Mississippi below Cairo was slight. The rises were 14.9 feet at Cincinnati, 7.9 at Cairo, and 5.3 at Memphis.

The breaking of a dam on the Shenandoah River caused a flood wave to descend this river and the Potomac. The water at Harpers Ferry, W. Va., reached a stage of 31 feet or 17 feet above the danger line. The wave was of short length and rapidly flattened as it descended, so that at Washington, D. C., the danger line was not reached.

CLIMATE AND CROP SERVICE.

By JAMES BERRY, Chief of Climate and Crop Service Division.

The following extracts relating to the general weather conditions in the several States and Territories are taken from the monthly reports of the respective services.

Snowfall and rainfall are expressed in inches.

Alabama.—The mean temperature was 63.2°, or 1.6° below normal; the highest was 98°, at Mount Willing on the 4th, and the lowest, 26°, at Oneonto on the 19th. The average precipitation was 2.27, or 0.20 below normal; the greatest monthly amount, 5.95, occurred at Alco, and the least, 0.90, at Rock Mills. The drought over the central and northern portions of the State, which began during the second decade of July, and which was only partially relieved by showers during the latter part of September and early part of October, was effectually broken by very general rains during the third decade. All field crops were practically gathered before this rainy season, which was badly needed to furnish water for stock, and which started up many cotton gins and mills which had for some time been idle on account of scarcity of water. There were no severe storms in this section during the month, which as a whole was a favorable one for the farmers, who have been able to do some fall plowing and seeding.

Arizona.—The mean temperature was 66.2°, or 1.1° above normal; the highest was 117°, at Parker on the 3d, and the lowest, 27°, at Fort Apache on the 31st. The average precipitation was 3.02, or 2.33 above normal; the greatest monthly amount, 8,80, occurred at Benson; no rain fell at Texas Hill.

Arkansas.—Report delayed.

California.—The mean temperature was 62.7°, or 1.6° above normal; the highest was 112°, at Volcano Springs on the 6th, and the lowest, 5°, at Bodie on the 28th. The average precipitation was 1.31, or 0.09 above normal; the greatest monthly amount, 5.02, occurred at Claremont, while none fell at Indio and Volcano Springs.

Colorado.—The mean temperature was 46.0°, or 0.5° below normal; the highest was 89°, at Crook and Lamar on the 1st, and the lowest, 7°, at Gunnison on the 30th. The average precipitation was 0.94, or 0.06 above normal; the greatest monthly amount, 3.80, occurred at Santa Clara, and the least, "trace," at Garnett, Gunnison, and Saguache.

Florida.—The mean temperature was 72.4°, or 1.7° below normal; the highest was 94°, at Lake Butler on the 22d, and the lowest, 40°, at Emerson on the 16th and Milton on the 19th. The average precipitation was 3.11, or 1.22 below normal; the greatest monthly amount, 7.75, occurred at Milton, and the least, 0.76, at Brookville.

Georgia.—The mean temperature was 64.0°, or about 1.0° below normal; the highest was 90°, at Brag on the 7th, and the lowest, 28°, at Clayton on the 19th. The average precipitation was 1.49, or 1.24 below normal; the greatest monthly amount, 3.36, occurred at Dahlonega, and the least, 0.50, at Hephzibah.

Idaho.—The mean temperature was 47.8°; the highest was 96°, at Payette on the 1st, and the lowest, 8°, at Chesterfield on the 6th. The average precipitation was 0.72; the greatest monthly amount, 1.74, occurred at Ola, while none fell at Minedoka and Rexbury.

Illinois.—The mean temperature was 50.8°, or 2.7° below normal; the highest was 87°, at Golconda on the 14th, and the lowest, 17°, at Lanark on the 21st. The average precipitation was 1.24, or 1.60 below normal; the greatest monthly amount, 2.80, occurred at Greenville, and the least, 0.05, at Streator.

Indiana.—The mean temperature was 50.7°; the highest was 86°, at Mount Vernon on the 29th, and the lowest, 20°, at Cambridge City on the 19th. The average precipitation was 1.15; the greatest monthly amount, 2.71, occurred at Edwardsville, and the least, "trace," at Bedford.

Iowa.—The mean temperature was 47.9°, or 1.6° below normal; the highest was 88°, at Malvern on the 1st, and the lowest, 12°, at Dows on the 20th, Elkader and Fayette on the 21st, Mason City on the 22d and 23d, and Spencer on the 24th. The average precipitation was 3.13, or 0.28 above normal; the greatest monthly amount, 5.05, occurred at Knoxville, and the least, 1.51, at Fort Madison.

Kansas.—The mean temperature was 54.2°, or 1.5° below normal; the highest was 95°, at Hutchinson on the 1st, and the lowest, 17°, at Colby on the 11th. The average precipitation was 2.79, or 1.04 above normal; the greatest monthly amount, 5.62, occurred at Halstead, and the least, 0.60, at Lakin.

Kentucky.—The mean temperature was 55.8°, or 0.2° below normal; the highest was 90°, at Ashland on the 30th, and the lowest, 25°, at Eubanks on the 25th. The average precipitation was 1.71, or 0.30 below normal; the greatest monthly amount, 3.50, occurred at Fords Ferry, and the least, 0.37, at Alpha. The weather was generally excellent for fall plowing, though a little dry in places. Winter wheat is reported to be growing very nicely.

Louisiana.—The mean temperature was 67.3°, or 1.0° above normal; the highest was 97°, at Maurepas on the 3d, and the lowest, 30°, at Amite on the 17th. The average precipitation was 5.34, or 2.82 above normal; the greatest monthly amount, 8.79, occurred at Port Eads, and the least, 1.16, at Cameron. Favorable weather for harvesting the crop continued to the 20th of the month, after which there was a retardation due to frequent rains. The heavy rainfalls in some localities caused considerable damage to cotton, making the bolls rot badly. There was, however, but little cotton in the fields at that time, and the damage was confined to the little late or top crop, which it was hoped would escape a killing frost. The rains benefited all vegetation, pastures, gardens, sweet potatoes, and turnips, and also favored the fall planted cane. Sugar grinding began at some plantations during the middle of the month, and continues throughout the belt at the close of the month, with generally good yields, the tonnage being fair and the amount of saccharine matter rather larger than usual at this time of the year.

Maryland.—The mean temperature was 52.6°, or 2.0° below normal; the highest was 85°, at Charlotte Hall school on the 31st, and the lowest, 16°, at Deer Park on the 26th. The average precipitation was 1.69, or 1.32 below normal; the greatest monthly amount, 5.19, occurred at Millsboro, and the least, 0.30, at Distributing Reservoir.

Michigan.—The mean temperature was 44.9°, or 1.6° below normal; the highest was 79°, at Vandalia on the 28th, and the lowest, 11°, at Iron River on the 18th. The average precipitation was 1.50, or 0.92 below normal; the greatest monthly amount, 4.69, occurred at Wetmore, and the least, 0.27, at Stanton.

Minnesota.—Report delayed.

Mississippi.—The mean temperature was 64.2°, or 1.0° below normal; the highest was 92°, at Leakesville, Hazlehurst, and Pearlington on the 3d, and the lowest, 31°, at Batesville on the 18th. The average precipitation was 3.74, or 0.92 above normal; the greatest monthly amount, 7.90, occurred at Hazlehurst, and the least, 0.27, at Hernando.

Missouri.—The mean temperature was 53.9°, or 1.6° below normal; the highest was 90°, at Pickering on the 1st, and the lowest, 19°, at Elmira on the 24th. The average precipitation was 2.52, or 0.05 below normal; the greatest monthly amount, 4.51, at Irena, and the least, 1.20, at St. Louis and Sikeston. In most sections the month was unusually favorable for fall work on the farm, and also for the growth of winter wheat, which is reported as looking fine.

Montana.—The mean temperature was 46.0°, or 4.0° above normal; the highest was 86°, at Fort Keogh and Miles City on the 2d, and at Glendive on the 4th; the lowest was 5°, at Wibaux on the 20th. The average precipitation was 0.50, or 0.36 below normal; the greatest monthly amount, 1.50, occurred at Choteau, and the least, "trace," at Martinsdale.

Nebraska.—The mean temperature was 47.9°, or 2.2° below normal; the highest was 91°, at Auburn on the 1st, and the lowest, 12°, at Kennedy on the 10th, and at Whitman on the 11th. The average precipitation was 1.83, or 0.35 above normal; the greatest monthly amount, 4.56, occurred at Nebraska City, and the least, 0.20, at Kimball and Seneca.

Nevada.—The mean temperature was 50.4°, or 1.0° above normal; the highest was 94°, at Sunnyside on the 1st, and the lowest, 11°, at Stofiel on the 24th. The average precipitation was 0.24, or 0.16 below normal; the greatest monthly amount, 1.02, occurred at Ruby Valley, while none fell at several stations.

New England.—The mean temperature was 46.6°; the highest was 78°, at Middletown, Conn., on the 31st, and the lowest, 12°, at Flagstaff, Me., on the 20th. The average precipitation was 3.58; the greatest monthly amount, 6.02, occurred at Hyannis, Mass., and the least, 2.00, at Fairfield, Me.

New Jersey.—The mean temperature was 51.5°, or 2.9° below normal; the highest was 82°, at Barnegat on the 27th and 31st, and the lowest, 21°, at Boonton, Charlotteburg, and Dover on the 26th. The average precipitation was 2.24, or 1.17 below normal; the greatest monthly amount, 4.58, occurred at Cape May City, and the least, 1.27, at Atlantic City.

New Mexico.—The mean temperature was considerably below normal; the highest was 87°, at Fort Union and Roswell, on the 1st, and the lowest, 11°, at La Belle, on the 16th. The average precipitation was more than three times the normal amount; the greatest monthly amount, 7.64, occurred at Shattucks Ranch, and the least, 0.09, at Raton.

New York.—The mean temperature was 46.6°, or 2.6° below normal; the highest was 79°, at Avon and Perry City on the 29th, and the lowest, 17°, at New Lisbon on the 26th. The average precipitation was 2.29, or 1.05 below normal; the greatest monthly amount, 6.49, occurred at South Canisteo, and the least, 0.58, at Rochester.

North Carolina.—The mean temperature was 57.5°, or 1.9° below normal; the highest was 85°, at Southport on the 1st, and the lowest, 23°, at Flat Rock on the 19th. The average precipitation was 1.90, or 1.65 below normal; the greatest monthly amount, 5.59, occurred at Kittyhawk, and the least, 0.36, at Roxboro.

North Dakota.—The mean temperature was 40.2°, or 3.6° below normal; the highest was 88°, at Washburn on the 25th, and the lowest, 5°, at Dickinson and Washburn on the 20th and at Medora on the 19th. The average precipitation was 0.78, or 0.28 below normal; the greatest monthly amount, 2.73, occurred at Wild Rice, and the least, "trace," at Coal Harbor.

Ohio.—The mean temperature was 49.0°, or 2.3° below normal; the highest was 85°, at Canal Dover on the 30th, and the lowest, 17°, at Hedges on the 25th. The average precipitation was 1.20, or 1.17 below normal; the greatest monthly amount, 3.52, occurred at Fostoria, and the least, 0.15, at New Bremen. Farmers made good progress with their work.

Oklahoma.—The mean temperature was 60.0°; the highest was 98°, at Anadarko on the 2d, and the lowest, 27°, at Beaver on the 30th. The average precipitation was 2.75; the greatest monthly amount, 6.68, occurred at Wagoner, and the least, 1.21, at Clifton and Keokuk Falls.

Oregon.—The mean temperature was 52.4°, or 0.4° above normal; the highest was 88°, at Dayville on the 1st, and the lowest, 15°, at Burns on the 22d and Silver Lake on the 9th. The average precipitation was 2.69, or 1.05 below normal; the deficiency was general throughout the State, but more marked in the eastern portion; the greatest monthly amount, 67.1, occurred at Nehalem; no rain fell at Burns.

Pennsylvania.—The mean temperature was 48.9°, or 1.4° below normal; the highest was 86°, at Warren on the 29th, and the lowest, 18°, at Blooming Grove on the 26th. The average precipitation was 3.19, or 1.41 below normal; the greatest monthly amount, 5.70, occurred at Williamsport, and the least, 0.94, at Elwood Junction.

South Carolina.—The mean temperature was 61.3°, or 1.0° below normal; the highest was 91°, at Little Mountain on the 2d, and the lowest, 28°, at Holland on the 18th. The average precipitation was 1.41, or 1.69 below normal; the greatest monthly amount, 2.75, occurred at Spartanburg, and the least, 0.38, at Allendale. The month was generally favorable for gathering autumn crops, but too dry for seeding wheat and oats, although much grain was sown. Germination and growth slow, but conditions were more favorable after the 20th.

South Dakota.—The mean temperature was 44.7°, or 2.5° below normal; the highest was 89°, at Hotch City and Pierre on the 3d, and the

lowest, 6°, at Webster on the 24th. The average precipitation was 1.87, or 0.82 above normal; the greatest monthly amount, 7.45, occurred at Tyndall, and the least, "trace," at Fort Meade and Nowlin.

Tennessee.—The mean temperature was 57.5°, or about normal; the highest was 88°, at Benton on the 8th, and the lowest, 27°, at St. Joseph on the 18th, and at Bristol on the 24th. The average precipitation was 1.54, or about 0.75 below normal; the greatest monthly amount, 3.56, occurred at Brownsville, and the least, 0.51, at Rugby.

Texas.—Report delayed.

Utah.—The mean temperature was 51.0°, or slightly above normal; the highest was 94°, at St. George on the 2d, and the lowest, 13°, at Giles on the 27th. The average precipitation was 0.61, or about one-half the normal; the greatest monthly amount, 1.53, occurred at Scipio, and the least, 0.10, at Mammoth.

Virginia.—The mean temperature was 54.7°, or 2.7° below normal; the highest was 85°, occurring at several stations on several dates; the lowest was 21°, at Stanardsville on the 19th. The average precipitation was 0.95, or 2.22 below normal; the greatest monthly amount, 2.90, occurred at Birdsnest, and the least, "trace," at Guinea.

Washington.—The mean temperature was 50.0°, or 0.2° below normal; the highest was 88°, at Centerville on the 18th, and the lowest, 18°, at Cascade Tunnel on the 8th. The average precipitation was 2.59, or 0.36 below normal; the greatest monthly amount, 7.88, occurred at Queets, and the least, 0.03, at Fort Simcoe.

West Virginia.—The mean temperature was 50.8°, or about 3.0° below normal; the highest was 82°, at Morgantown on the 29th, and the lowest, 20°, at White Sulphur Springs on the 19th, and at Marlington and Philippi on the 25th. The average precipitation was 2.08, or about 1.00 below normal; the greatest monthly amount, 4.37, occurred at Weston, and the least, 0.45, at Old Fields.

Wisconsin.—The mean temperature was 44.1°, or about 2.0° below normal; the highest was 78°, at Appollonia on the 1st, and the lowest, 4°, at City Point on the 22d. The most notable feature of the month was the almost total lack of precipitation, until the 28th, and the excessive precipitation of the last three days, which brought the monthly average nearly to the normal amount for the month. The greatest amount, 4.22, occurred at Grantsburg, and the least, 0.12, at Menasha.

Wyoming.—The mean temperature was 44.8°, or 1.0° below normal; the highest was 89°, at Wheatland on the 5th, and the lowest, 10°, at Fort Laramie on the 24th, Lander on the 29th, and Fort Washakie on the 30th. The average precipitation was 0.50, or 0.26 below normal; the greatest monthly amount, 0.87, occurred at Lusk, and the least, 0.12, at Wheatland.

DELAYED SEPTEMBER REPORT.

Arizona.—The mean temperature was 77.6°, or 4.0° above normal; the highest was 1.12°, at Parker on the 16th, and the lowest, 35°, at Whipple on the 24th. The average precipitation was 1.87, or 0.67 above normal; the greatest monthly amount, 4.62, occurred at Allaires Ranch, Cochise County, while no rain fell at San Simon in the same county.

SPECIAL CONTRIBUTIONS.

THE INTERNATIONAL METEOROLOGICAL CONFERENCE AT PARIS, SEPTEMBER, 1896.

By A. LAWRENCE ROTCH (dated Nov. 14, 1896).

This Conference, which was held in Paris between the 17th and 23d of September, 1896, was similar in character to that which met in 1891 at Munich, that is, it was composed of invited representatives from the principal meteorological services and observatories of the world. The following gentlemen attended the meeting: MM. Angot, Paris; Anguiano, Mexico; Baillaud, Toulouse; von Bezold, Prussia; Biese, Finland; Billwiller, Switzerland; Ellis, Greenwich; Erk, Bavaria; Fines, Perpignan; Hepites, Roumania; Hergesell, Alsace-Lorraine; Hildebrandsson, Sweden; Jaubert, Paris; Kesslitz, Pola; Konkoly, Hungary; Lancaster, Belgium; Mascart, France; Mohn, Norway; Moureaux, Parc Saint Maur; Neumayer, Germany; Paulsen, Denmark; Riggenbach, Bale; van Rijckevorsel, Netherlands; Rotch, Harvard and Blue Hill observatories; Rykatcheff, Russia; Scott, Great Britain; Schmidt, Stuttgart; Snellen, Netherlands; Stupart, Canada; Symons, London; Tacchini, Italy; Teisserenc de Bort, Paris; Thévenet, Algeria; Watzoff, Bulgaria; Wragge, Queensland, Australia. The following guests were admitted to the meeting as specialists: MM. Dufour, Lausanne; Page, United States Hydrographic Office, Washington; Tolnay, Budapest; Rücker, London; Becquerel, Fron, Chauveau, Mathias, and de Fonvielle, Paris.

Officers of the meeting were chosen as follows: President, M. Mascart; Vice Presidents, MM. von Bezold and Tacchini; Secretaries, MM. Scott, Erk, and Angot. The language of the Conference was French, but communications in German and English were allowed. Mr. Scott, Secretary of the Permanent International Committee, read a report of the work which had been done since its meeting at Upsala. The provisional programme of questions proposed for the meeting was then taken up and subcommittees were appointed to consider the questions relating to international telegraphy, instruments and methods of observation, cloud observations, terrestrial magnetism and atmospheric electricity, and to report to the Conference. It was the opinion of the Conference that decisions of former meetings should not be reconsidered, and that there should be no interference with government work. Several questions were excluded as beyond the province of the Conference; others were referred to future meetings, among them being the proposition of Prof. Bigelow to adopt the solar magnetic period, and the question left over from the Munich Conference as to the best methods of extending observations and meteorological publications in the interest of agriculture. No report on this subject had been received from the committee appointed at Munich, but the Chief of the United States Weather Bureau sent for distribution specimens of the agricultural bulletins and weather predictions issued in different sections of the United States.

In this account of the proceedings the questions which were not definitely acted upon are not mentioned.

Mr. Symons' proposition of double stations, left over from the Munich Conference, was finally settled thus:

It is desirable that at one station, at least, in each country, there should be used simultaneously with the ordinary thermometer shelter, such other arrangements as the Stevenson screen and the French screen, and at least the Assmann aspiration thermometer (large size) of the present construction (Fuess, 1896). Comparisons should be continued during two years, and if the results can not be published *in extenso* the means and extremes should at least be given for each month. It is also considered very important that a uniform model of shelter be adopted in each country, and that a complete description with drawings and dimensions be published, so that it can be reproduced exactly anywhere.

Monthly charts were presented to the Conference by M. Paulsen indicating the floating ice in the Atlantic north of the sixtieth parallel, and the following resolution was adopted:

The Conference appreciates the high scientific value of the work undertaken by M. Paulsen. It expresses the wish that the institutions receiving reports from navigators in the northern seas above 60°, should send to M. Paulsen the observations which they may collect.

Mr. Wragge's proposal to establish stations on Mount Wellington (4,650 feet) in Tasmania, and on Mount Kosciusko (8,000 feet) at the southeast extremity of Australia, and to publish hourly observations was approved by the Conference.

The following proposition of Dr. Hann was adopted:

The directors of the meteorological services of the different countries are requested to give in their annals a list of the publications relating to meteorology and terrestrial magnetism appearing in their countries.

M. Hildebrandsson read a note on the necessity of creating

stations of observation around the great centers of action in the atmosphere, and the Conference, appreciating the high scientific value of the observations presented by M. Hildebrandsson, hoped that his desire might be realized.

M. Billwiller reported to the subcommittee on the proposition of the central offices at Hamburg and Utrecht relative to the acceleration of meteorological telegrams which had been submitted to the International Telegraphic Congress at Budapest.

The committee believes that the best means of establishing international relations between the different series would be to constitute a system of circular dispatches at a fixed hour between the central offices. Nevertheless, on account of the difficulties which this organization now presents it is desirable that the data relating to each country should be centralized at the various offices in time for the international exchanges to be made at the latest before 11 a. m., Greenwich time.

It was considered of interest to try the "circuit system" between neighboring countries, but it was not thought desirable to change the form of the dispatches or to fix the hours of observation in the various countries. The wish was expressed that the arrival of these dispatches at Paris be accelerated, particularly those from the Iberian Peninsula, which, although of great importance in certain situations, always arrive too late to be utilized. As regards the publication, the committee believed that the study of meteorological phenomena over a large territory requires the knowledge of practically simultaneous observations. The previous recommendation was recalled, that in each country hourly observations should be published by a certain number of principal stations, and it was further requested that the services publish regularly and with little delay the monthly means of observations made at the telegraphic stations.

M. Snellen read a note to the Conference on the use of Olland's telemeteorograph, which is in operation between Utrecht and Vlissingen (Flushing), and the Conference thought that its use might improve the forecasts.

Mr. Rotch's question as to recording thunderstorms was thus answered:

1. The symbol ⊤ is to be added to the international symbols adopted by the Vienna Congress, to designate the days on which distant thunder has been heard.

And, in accordance with the Vienna decision:

2. The symbol ≤ is to be reserved for distant lightning and for diffuse lightning (Wetter Leuchten, sheet lightning).
3. The symbol ⊤≤ is to indicate all cases when both lightning and thunder have been observed together.
4. In the summaries the number of days with thunderstorms will be, as far as possible, counted separately for each of these three cases.

As to the registration of the hours of sunshine, submitted by the Royal Meteorological Society, it was decided:

In the present state of science the duration of visibility should be the chief object; the problems of relative intensity ought to be made the object of special investigations. For general climatology it is necessary that the instrument should have such an exposure that the horizon is entirely visible. The duration of insolation should be referred to the apparent daily duration.

The International Committee was requested to name a special commission for the study of solar radiation.

Regarding the adoption of a standard anemometer and of a uniform exposure for anemometers:

The Conference considers it impossible at present to recommend any one instrument as a standard or any uniform mode of exposure for all stations.

The Royal Meteorological Society's question as to the uniformity of conditions for the measurement of soil temperatures was recommended for study and presentation to the next Conference.

M. Mohn read a paper on the use of the hypsometer as a substitute for the barometer, as a control instrument for the latter knowing the force of gravity, and as a method of determining the gravity correction by simultaneous observations of the hypsometer and of the mercurial barometer.

M. Billwiller presented a report on the necessity of adopting a uniform method of reducing barometer observations to sea level in the construction of synoptic charts, which was submitted to the directors of meteorological services.

At the reunion of the subcommittee on clouds, reports were presented by the representatives of the different countries, showing what was being done in response to the circular of the International Committee, asking for participation in the international scheme of cloud observation. It appeared that measurements with theodolites or photo-theodolites (photogrammeters) were now being made at one or more stations in Norway and Sweden, Russia, France, Prussia, United States, and Canada, as well as Batavia and at Manila. It is expected that such measurements will be instituted in Hungary, at two stations in India, and at two stations at Sydney, Australia. In addition to these measurements, nephoscopic observations of the direction and apparent velocity of clouds are being made in Norway and Sweden, Denmark, Russia, France, Belgium, Prussia, Pola (Austria), Bucharest (Roumania), Switzerland, Hohenheim (Wurtemberg), Strassburg (Alsace-Lorraine), Holland and United States. Such a station will also be established at Victoria (British Columbia). The following resolution was adopted:

It is desirable that the direct observations of clouds be continued at the secondary stations until the close of the year 1897, in order that there may be available, in any case, a synoptic series embracing one year. It is also desirable that the central offices should continue their measurements, when it is possible, until that time.

The Conference accepted the Cloud Atlas published by MM. Hildebrandsson, Riggenbach, and Teisserenc de Bort of the International Cloud Committee, and the following persons were afterward appointed by the International Committee as a new Cloud Committee: MM. Hildebrandsson, Riggenbach, Rykatcheff, Teisserenc de Bort, Sprung, Mohn, and Rotch.

Probably the most important work done at the Conference was in relation to terrestrial magnetism and atmospheric electricity. Reports were presented to the subcommittee showing the progress of the magnetic survey of Europe. M. von Bezold and M. Eschenhagen, of Potsdam, proposed certain general principles for the publication of magnetic observations, and discussed the distribution of magnetic observatories over the globe. They likewise proposed certain general principles for the construction of magnetic charts in each country. Some of these propositions were adopted, some were adopted after modification, and others referred to a special commission to be nominated by the International Committee. Other resolutions were as follows:

The Conference considers it desirable to take steps to organize, at fixed epochs, simultaneous observations of declination and horizontal force, especially by photographic methods, more rapid and sensitive than the ordinary recorders. The use of similar instruments is preferable.

It is important to develop the study of earth currents. This investigation, like that of magnetic phenomena, should only be undertaken in the open country, distant from the industrial electric installations.

The Conference recommends the development of the methods of studying atmospheric electricity by self-recording instruments.

Members of the Conference who are interested in meteorological aeronautics proposed the following resolutions which were adopted by the general assembly:

1. The Conference recognizes the great importance of aeronautical investigations for meteorological science and expresses the desire that scientific ascensions should be encouraged and multiplied.
2. The Conference expresses the wish that scientific ascents, either with manned balloons or with pilot balloons, should take place simultaneously at the different stations.
3. At the present time the Conference can not recommend either special methods or particular instruments, but it desires that, so far as

possible, identical instruments should be used during the simultaneous ascensions of pilot balloons.

4. The prompt publication of the unreduced observations, especially those which are made in simultaneous ascensions, is of capital importance.

5. It is desirable that observations in captive balloons, which are not manned, should be systematically made.

6. On account of the satisfactory results which have been attained at Blue Hill with kites carrying registering instruments up to 2,000 meters, it is desirable that similar investigations be undertaken elsewhere.

A provisional aeronautical committee was nominated afterwards by the International Committee to further these resolutions, consisting of MM. Hergesell, Erk, and Assmann, of Germany; Cailletet, de Fonvielle, Hermite, and Jaubert, of France; Pormatzoff, of Russia, and Rotch, of the United States.

On the demand of M. Snellen—

The Conference requests the International Committee to convoke a reunion of the directors of those institutions that are interested in maritime meteorology, in order to establish uniformity in methods of observation and publication, and it desires that a report on this question be presented to the next Conference.

M. Mohn announced that Dr. Nansen had collected between latitudes 81° and 86° three entire years of meteorological observations made every four hours, and comprising also the continuous registration of pressure and temperature, as well as magnetic and hydrological observations, etc. M. Mohn promised to do his best to reduce and to publish all these observations according to the methods adopted by the meteorological congresses and conferences.

It was decided that a new International Committee be constituted in the same manner and that it have the same functions as the former one. The former committee was reelected with the three vacancies filled as follows: Mr. Ellery, of Melbourne, was replaced by Mr. Russell, of Sydney; Mr. Harrington by Mr. Moore, the new director of the Weather Bureau; and M. Wild by M. Rykatcheff, his successor as director of the Russian Meteorological Service. The seventeen members of the committee are, therefore: MM. von Bezold, Germany; Billwiller, Switzerland; de Brito-Capello, Portugal; Davis, Argentine Republic; Eliot, India; Hann, Austria; Hepites, Roumania; Hildebrandsson, Sweden; Mascart, France; Mohn, Norway; Moore, United States; Paulsen, Denmark; Russell, New South Wales, Australia; Rykatcheff, Russia; Scott, Great Britain; Snellen, Netherlands; Tacchini, Italy. Authority was given to the committee to fill vacancies in its body and to replace its officers at a meeting called for the purpose. It was afterwards announced that M. Mascart had been chosen president, and that Mr. Scott would retain the office of secretary to the committee.

The French edition of the proceedings of the present Conference, with appendices, containing reports, etc., will be printed and distributed as soon as possible. Mr. Scott will bring out the English edition, and M. von Bezold the German edition. It was decided that the interval of five years adopted at Munich between it and the present Conference should determine the date of the next Conference which, accordingly, is to be held in 1901, at a place to be appointed by the Permanent International Committee.

THE INTERNATIONAL, HYDROLOGICAL, CLIMATOLOGICAL, AND GEOLOGICAL CONGRESS AT CLERMONT-FERRAND.

By A. LAWRENCE ROTCH (dated Nov. 20, 1896).

The fourth session of the Congress (in accordance with the decision of the Congress held at Rome in 1894) was held at Clermont-Ferrand, Department of the Puy de Dome, France, between September 28 and October 2, 1896. It was attended by about 200 persons, of whom much the greater number were French physicians. Twelve countries were represented, most of them by several delegates. Professor Proust, general inspector of sanitary services, who represented the Minister of Public Instruction, was the honorary president. The principal officers elected were: Dr. de Rause and Dr. Fredet, president and general secretary, respectively, of the committee of organization, who were confirmed in these offices for the meeting. The honorary vice president was Dr. Berthenson, of Russia, and the honorary vice presidents were: Professor Ludwig, of Austria, Professor Kuborn, of Belgium, and Mr. Rotch, of the United States. The presidents of the three sections into which the Congress was divided were French, and were as follows: Hydrology, Dr. Cazaux; climatology, Professor Hurion; geology, M. Levy. The latter section was first organized at this meeting.

Reports upon certain questions proposed by the organization committee served as a basis for subsequent discussions. The most important of these reports were: The controlling action and specialization of different mineral waters according to their therapeutic action, by Dr. Max. Durand-Fardel; carbonic acid and alkaline bicarbonates in mineral waters and their therapeutic action, by Dr. A. Labat; investigation of methods to determine the degree of purity and the color of the sky and their influence on hygiene, by Prof. A. Hurion; the role of meteorological observations in the study of climate, by M. A. Angot; conditions which affect the circulation of dusts in the atmosphere and the influence of these dusts on health, by M. J. R. Plumandon; the régime of winds in certain regions and their influence on the sanitary conditions, by Dr. de Valcourt; what is to be understood by high climates and what conditions should be fulfilled, with a statement of the chief therapeutic indications, by Dr. E. de la Harpe; influence of earthquakes on the régime of mineral waters, by Prof. P. Girod; the relation of deep artesian wells to certain mineral springs, by Prof. L. de Launay.

The other reports, and the majority of the papers presented, treated of the curative effect of special waters and climates, with the relative advantages of different stations, and of the development and exploitation of mineral sources. Professor Kuborn described the work in Belgium of the medical climatological and geological service of the Society of Public Medicine and a French climatological association was proposed by Dr. Piche, similar to that existing in southwest France, which has its central station at the Carlier Observatiry at Orthez.

There were several conferences of a more general interest; Dr. Labat spoke on the history of hydrology and Professor Velaine on the geology of the central plateau. The observatory on the Puy de Dome (4,800 feet) was the first of the French mountain stations for meteorology and was completed about 1873; the director, Professor Hurion, compared its climate with that of Clermont. During the Congress there was an exhibition of waters from neighboring thermal stations with models and drawings of the surroundings. The thermal establishment of Royat was visited, and after the Congress closed excursions were made to Vichy, Neris, La Borboule, Mont Dore, and Saint Nectaire.

At the closing meeting it was voted to hold the next session at Brussels in 1898. The proceedings of the present Congress will be published by a commission appointed by the committee of organization and will be distributed to the members.

HORIZONTAL ATMOSPHERIC ROLLS.

By FRANK W. PROCTOR (dated November 6, 1896).

On two occasions during the winter of 1895–96, the writer had the pleasure of observing at Waynesville, Heywood Co., N. C. (N. 35° 30′, W. 83° 0′), numerous horizontal atmospheric rolls which were made visible by clouds floating in the rolls. The circumstances were as follows:

About 7 o'clock a. m., the observer was looking to the south-

ward through a window about 10 feet from the eye, up a long, wide, flat valley, running northerly and southerly between two ranges of the Balsam Mountains. The air current, at a height of about 4,000 feet, was from a westerly direction, and a continuous procession of small cumuli was floating across the field of view, projected upon the window panes, which afforded an excellent opportunity for observing both the progressive and the proper motion of the clouds.

It was first noticed that one of the cumuli was fast changing in shape, and that its summit was continually falling and being replaced by another summit rising from behind. As that cloud drifted out of the field of view and others came in sight, they were all seen to be changing in the same manner. Then it was noticed that the entire fronts of the clouds were falling and their rear portions rising; next that the horizontal, easterly motion of the tops of the clouds across the window panes was much more rapid than the vertical motions of the fronts and rears, and finally that the lower edges were nearly stationary.

Then it was perceived that all these apparent motions were the resultant of the progressive motion of the clouds, and a motion of gyration round an axis. There was not sufficient vertical motion of any cloud, as a whole, to be noticeable, and it was obvious that the axis was within the cloud, and that each cloud substantially filled a cross section of a horizontal air roll which was "end on" to the observer. The gyratory velocity was moderate, and on the first day it was several minutes before all the motions mentioned had been noticed and correlated in the mind. The period of observation lasted about half an hour, and as the progressive motion was tolerably brisk (from 15 to 20 miles an hour probably) and as several clouds were constantly within the field of view, hundreds of them must have been seen. No cloud was observed that did not have the gyratory motion.

On going out of doors to ascertain how far the field of rolls extended, it was seen that the clouds in the whirls were all to leeward of a large, standing, nocturnal cloud, hanging over "Platt's Balsam," the summit of which is 6,500 feet above sea level, and 3,800 feet above the floor of the valley, and that they all evaporated before reaching the high range of mountains on the other side of the valley. The clouds observed through the window were at least two miles from the standing cloud.

The coincidence in size of the clouds and the cross sections of the rolls seemed at first thought to indicate that the whirls were effective in condensing the clouds, but the better opinion seemed to be that these rolls, while drifting over the Balsam Mountains, tore off from the standing cloud as much as they could contain in cross section, and carried it along rolling over and over as described.

Possibly the air rolls themselves were formed at the ridge of the "Balsams," where the standing cloud was formed. A half hour's observation on the second occasion under identical circumstances, as far as could be perceived, verified the observations above described. The weather was fair and no other clouds were visible. Similar standing clouds at the same place, with fragments blown away to leeward, were frequently seen afterward, but no revolving clouds were seen at any other time.

The similiarity in size, shape, and motion of the clouds indicated a succession of parallel, horizontal air rolls of tolerably uniform dimensions following one another closely. The clouds were all considerably south of the zenith, and nothing could be seen of the longitudinal dimensions of the rolls.

LONG RANGE SEASONAL PREDICTIONS FOR OREGON.

By B. S. PAGUE, Local Forecast Official.

In the REVIEW for March, page 166, we called attention to the general prediction of summer weather made by Mr. B. S. Pague, Local Forecast Official at Portland, Oreg. We now reprint from the Weather Map for 8 a. m. eastern time, or 5 a. m. Pacific time, October 29, 1896, published at the Weather Bureau station at Portland, Oreg., the following synopsis and general forecast, indicating the approach of the winter season:

WEATHER SYNOPSIS AND GENEBAL FORECASTS.

The first winter storm of the season has made its appearance, and from now until the summer type appears in the spring of 1897, it is more probable that rain will fall than that fair weather will prevail. In 1895 the first winter type of storms appeared on November 12 and continued to prevail until June 13, 1896, when the summer type appeared. The winter is distinguished from the summer by the movement of the high and low areas; in the winter type the lows move from the north southward along the coast line to Vancouver Island, or lower, thence eastward; while the low is moving in this way the high pressure areas move from the ocean on the southwest of California to about Cape Mendocino, thence eastward to about Great Salt Lake, where they remain stationary and gradually dissipate. In the summer type the low areas move eastward about the latitude of Sitka and the areas of high pressure move northward to about the latitude of Vancouver Island, thence eastward; when they reach the summit of the Rocky Mountains, northeast of Spokane, then very warm weather prevails; when the highs are moving along the coast cooler weather prevails. In winter warmer weather, caused by dynamic heating, prevails when the highs are central about Great Salt Lake. The areas of low pressure follow each other in quick succession, and the more rapid their appearance the more frequent the rain. Continuous rain is not the idea, but rather the summer or dry season is past, and the winter or rainy season is present.

NOTES CONCERNING THE WEST INDIA HURRICANE OF SEPTEMBER 29-30, 1896.

By A. J. HENRY, Chief of Division of Records and Meteorological Data (dated November 10).

[CONTINUED FROM THE SEPTEMBER REVIEW.]

As stated in the September REVIEW (page 317 of this volume), the violence of the storm of the above date was not uniform throughout its entire course. There seems to have been two distinct periods of unusual violence separated by a period during the afternoon of the 29th when the winds exhibited but little destructive power.

Evidences of unusually violent winds were observed on every hand throughout the storm's course in the States of Florida and Georgia. In the counties of Levy, Alachua, Lafayette, Suwannee, Columbia, Bradford, and Baker, Fla., the destruction of pine timber was enormous, the monetary loss from that source alone being estimated at $1,500,000. During the early part of the storm the trees were torn up by the roots, but as the force of the wind increased they were broken and twisted off and thrown forward in a confused mass.

At Jacksonville, a little south and east of the storm's path, the self-registers show the maximum wind velocity, 70 miles per hour, to have occurred coincidently with the minimum of pressure. Violent winds continued for an hour and a half after the occurrence of the barometric minimum. The average velocity during the continuance of the storm, or from 9.10 a. m. to 12 noon, was 52 miles per hour, rising during a portion of the time to 63 miles, which velocity was maintained continuously for an hour.

The self-registers at Savannah indicate quite clearly that that city was in or very near the center of the storm's path. The barograph curve is exceedingly interesting. It is of the V-type characteristic of thunderstorms and tornadoes. The fall was quite slow at first but increased rapidly as the center of the disturbance approached. The fall from noon to 12.45 p. m. was .45 inch, almost all of which had been recovered by 2 p. m. Unfortunately the electrical recording apparatus of the anemometer was disabled at about 12.15 p. m., and the highest velocity can not therefore be obtained. The average velocity during the 28 minutes the recording apparatus failed to register was 75 miles per hour, a velocity

somewhat greater than at Jacksonville. The duration of the storm at Savannah was about 2 hours, and the average velocity during that time was 55 miles per hour.

The storm passed to the westward of Charleston, and though the wind at that station attained a velocity of 62 miles per hour for five minutes, but little damage was done. A velocity of 50 miles per hour prevailed continuously from 1.10 to 2.10 p. m., and an average hourly velocity of 44 miles prevailed from 12.45 to 3.30 p. m. The total fall in pressure amounted to but .4 inch, all of which had been recovered by 7 o'clock p. m.

North of Charleston the storm winds appeared to diminish in strength. There are no Weather Bureau stations directly in the path pursued by the storm between Charleston and Richmond, although it must have passed within 30 or 40 miles of the Weather Bureau station at Raleigh. The wind register at the last-named place showed a maximum velocity of only 26 miles, and the greatest hourly velocity was but 23 miles. At Charlotte, about 120 miles west-southwest, the maximum velocity was also 26 miles. Here a gust preceded the storm proper by about an hour, the wind in the interval being almost calm. The greatest hourly velocity at Charlotte was 20 miles.

A maximum velocity of 34 miles per hour was recorded at Lynchburg, Va., another station on the western side of the storm's path, and the greatest hourly velocity was 26 miles. At Norfolk on the eastern side, and at about the same distance from the storm center, a maximum velocity of 38 miles was registered ten minutes later than the time of maximum velocity at Lynchburg. While the maximum velocity at Norfolk was but slightly greater than at Lynchburg, the velocity of the wind on the average for the six hours ending midnight of the 29th was exactly twice as great as at Lynchburg. No safe conclusion can be drawn from this fact, however, since the ratio of the wind velocity at Lynchburg to that of Norfolk is about as the numbers 4 to 10.

The storm center evidently passed slightly to the westward of Washington. The wind gradually increased in violence, reaching a maximum velocity of 66 miles per hour for five minutes at 11.15 p. m., and maintaining an average velocity of 56 miles from 10.40 p. m. to 11.40 p. m. The wind was remarkable for this locality both on account of its duration and the high velocity attained. The trees in the city and suburbs suffered greatly, although in sheltered places little damage was done. At the Dalecarlia Reservoir (a sheet of water a little less than an eighth of a mile wide) the effect of the increased velocity of the wind, caused by passing over a water surface, is plainly seen. The north bank of the reservoir is lined with a grove of pine trees about 6 inches in diameter. Probably 80 per cent of the trees on the northern edge of the reservoir were broken off 10 to 15 feet above ground, while the destruction at some distance inland from the water was not more than about 5 per cent.

The wind at Baltimore, 40 miles east-northeast of Washington, was less violent than at the last-named place, the maximum velocity for five minutes being but 36 miles per hour.

At Harrisburg, Pa., the winds were even more violent for a short period than at Washington. The maximum velocity of 72 miles per hour occurred at 1.10 a. m., two hours, lacking five minutes, later than at Washington. This would give the storm a rate of progression of over 50 miles per hour, somewhat greater than the average velocity over the entire course.

The greatest average hourly velocity at Harrisburg was 47 miles for one hour and 45 miles for two hours.

Instrumental records of wind velocity between Harrisburg and Lake Ontario are wanting, but from reports of damages by wind at intermediate points it is inferred that there was a decided lull in the violence of the storm while passing through northern Pennsylvania and central New York, followed by a renewal of activity in Cayuga and Cortland counties, New York. It passed thence to the St. Lawrence Valley as an ordinary rain and wind storm.

Comparison of the relative wind velocities on the two sides of the hurricane can not well be made. The number of self-registering wind instruments in the storm's path was quite small, and moreover there is considerable uncertainty regarding the exact position of the area of lowest pressure. Local differences of anemometer exposure also prevent comparison of wind velocities except under the most favorable circumstances. The maximum velocities recorded near the center of the storm as at Jacksonville, Savannah, Washington, and Harrisburg were the highest ever known.

It may also be interesting to note that though the storm passed northward through nearly 15° of latitude its easting was but 3.5°. The general course of West India hurricanes after passing the lower latitudes is northeasterly. In the present case the pressure distribution to the eastward seemed to give the storm a more northerly direction of motion.

NOTES BY THE EDITOR.

FORMS OF CLOUDS.

On several occasions the Editor has stated that there is probably no peculiar form of motion that is possible for a gas that may not be found illustrated in some meteorological phenomenon and many of these forms are visibly illustrated in the ordinary clouds themselves. Numerous students of cloud forms have, during the past two hundred years, described the great cumulus clouds, from whose tops there stream forward a haze which stretches many miles in the approximate direction toward which the thunderstorm is moving. In the early part of the present century the study of these overflows was a favorite topic with Espy, Daniell, Dalton, and other observers. This overflow from the top of the cloud is mechanically similar to the gentler overflow of any current of air on itself when it has risen higher than its position of equilibrium. Similar overflow currents are frequently to be observed in the rivers and the oceans, and there, as well as in the atmosphere, we may observe the phenomena, due to the fact that two currents are flowing in nearly opposite directions while the boundary surface between them becomes mechanically unstable and is, therefore, thrown into a great variety of curves, waves, and breakers. When the horizontal motions of upper and lower layers are strongly opposed to each other and especially when there is a thin stratum of intervening quiet air the median layer is thrown into a movement like that of a series of horizontal rolls which remain stationary if the upper and lower winds are equal, but ordinarily move along slowly in the direction of the stronger current. As they advance their movements sometimes become slower until finally the rotary motion practically ceases and the clouds, having diminished to a very small size, glide smoothly and slowly as if along down a gently inclined plane. If the descent is rapid, the clouds dwindle away and disappear more rapidly, but if it is very slow, they may extend for a hundred miles as a sheet of the most delicate cirrus or cirro-cumulus, or if they are lower down, alto-cumulus. Sometimes we lose

sight of the origin of the descending layer of air and the observer recognizes only a lower quiet mass of air above which another is rapidly gliding.

Whenever an obstacle interferes with the movement of the air it is thrown into a series of disturbances which may either be a gentle rise and overflow or of the nature of horizontal rolls or of the simpler structure represented by the standing waves behind an obstacle in the current of a river. In the latter case the wave formation is oftentimes invisible, but sometimes the air is thrown up high enough, and cools by expansion low enough, to form a cloud at the summits of the successive waves. In most cases such formations are attended with a mixture of the upper and lower layers of air within each whirl or wave; if in such cases the air that is drawn in has an abundance of moisture, a cloud is formed which, however, diminishes as it proceeds further to the leeward, owing to the steadily increasing proportion of drier air and the absorption of heat radiated from sun or earth. In other cases the general equilibrium of the atmosphere is so near to the condition of unstable equilibrium that a cloud which is small when first formed at the location of the first wave becomes larger as it advances to the leeward and, finally, breaks up into a mass of small rolls and clouds that constitute a continuous horizontal layer of stratus clouds and, finally, miles away, develops rain. The careful observer will find abundant illustrations of these processes, and that, too, as frequently in the torrid zone and tropics as in the temperate zone and polar regions. Among the special contributions in this number of the REVIEW Mr. Proctor describes the horizontal rolls seen by him among the high lands of western North Carolina. In his Preparatory Studies, and still more fully in the American Meteorological Journal, Vol. VIII, pp. 250–264, the Editor has given details of many forms of "overflow clouds," and in a memoir on the classification and nomenclature of clouds he has given these their proper place. To the weather forecaster they are exceedingly useful as indications of approaching storm.

The following note by Mr. John Aitken, dated March 28, 1896, and published in the Proceedings of the Royal Society of Edinburg, is here inserted as showing still another view of the same subject:

There are two points connected with clouds on which I wish to make a few remarks. The first is on the classification of clouds, and the second on the manner in which certain forms of clouds are produced. It may be as well to remark at the outset that the observations are those of an "outsider," being in a department of meteorology to which the writer has given but little attention, and they have been written with the view of calling attention of specialists and getting their opinion of the subject.

It appears to me that in classifying clouds they ought, first of all, to be divided into two great classes. In the one class should be placed all the clouds in the process of *formation*, and in the other those in the process of *decay*. The two classes might be called—*clouds in formation* and *clouds in decay*. We may take cumulus clouds as an example of the former and nimbus of the latter. My observations made in the clouds themselves have shown that there is a difference in the structure of these two classes of clouds. In clouds in formation the water particles are much smaller and far more numerous than in clouds in decay, and while the particles in clouds in decay are large enough to be seen with the unaided eye when they fall on a properly lighted micrometer, they are so small in clouds in formation that, if the condensation is taking place rapidly, the particles can not be seen without the aid of a lens of considerable magnifying power. In the former case the number of particles falling per square millimeter is small, while in the latter they are so numerous that it is impossible to count them.

It appears that one good end might be served by adopting this classification. It would direct the attention of observers more to looking on the processes going on *in decay* for an explanation of many of the forms observed in clouds. In most books on clouds, when describing the different shapes of clouds, it is almost always assumed that they are in the process of *formation*, and the whole explanation of the shapes taken by the clouds is founded on this supposition. Now it is very evident that very many clouds are in the process of decay, and their forms can only be explained by the processes going on under these conditions.

This brings me to the second point in this communication, namely the manner in which ripple-marked cirrus clouds are produced. The explanation which has generally been accepted of the formation of this form of cloud is that the ripple marking are due to the general movements of the air giving rise to a series of eddies the axes of the eddies being horizontal, and roughly parallel to each other. It is very evident that the air revolving round these horizontal axes, that is, in a vertical plane, will at the lower part of its path be subjected to compression, and at the upper part to expansion. The result of this will evidently be, supposing the air to be nearly saturated with moisture, a tendency for cloudy condensation to take place in the air at the upper part of its path, and it is this cloudy condensation in the upper part of the eddies that is supposed to produce the ripple-like cirrus; each ripple mark indicating the upper part of an eddy. One objection I have always held to this explanation is, that it is difficult to imagine that the small amount of elevation and consequent expansion and cooling could give rise to so dense an amount of clouding as is generally observed. Any clouding produced in this way one would expect to be extremely thin and filmy. I have for the last few years made frequent observations of these clouds, and I have to admit that I have never once seen them in the process of formation, or seen one appear in a clear sky. In all cases that have come under my observation, these ripple clouds have been clouds in decay. They are generally formed out of some strato-cirrus or similar cloud. When we observe these strato-cirrus in fine weather, it will be found that they frequently change to ripple-marked cirrus before vanishing. The process of their formation would seem to be: The strato-cirrus gradually thins away till it attains such a depth, that if there are any eddies at their level, the eddies break the stratus cloud up into parallel or nearly parallel masses, the clear air being drawn in between the eddies. It will be observed that this explanation requires the eddies, but not to produce the clouding, only to explain the breaking up of the uniform cirrus cloud into ripple cirrus.

One thing which supports this explanation is that lenticular-cirrus are frequently observed with ripple markings on one or more sides of them just where the cloud is thin enough to be broken through by the eddies. If we watch these lenticular formed clouds under these conditions, we frequently see the ripple markings getting nearer and nearer the center as the cloud decays; and at last, when nearly dissolved, the ripple marking will be seen extending quite across the cloud. It seems probable that "mackerel" and other cloud forms may be produced in the same way.

The shapes which these cirrus assume are much more varied than is generally supposed. I lately observed a most interesting form in the south of France while the mistral was blowing strongly. There were a few cirrus in the sky at the time, and one of these was rapidly being broken up into irregular ripple forms, but at one point there was formed a most perfectly cylindrical-shaped piece, its length being about twenty times its diameter. The whirling effect of the eddy was very evident by the circular streaking of the clouding. Further, this cloud was evidently hollow, that is, the interior was filled with clear air, as the cloud was thinest along the axis, and it had all the appearance of a revolving tube of cloudy air.

It is not contended here that ripple clouds are never produced in the manner which has generally been accepted, only that so far as the writer's observations go they have never been observed forming in the manner supposed. It is hoped that others will put the explanation here offered to the test of observation, and it is principally with a view of getting others to repeat the observations that this has been written.

These conclusions as to the formation of cirri by the decay of stratus harmonize perfectly with the observations and publications of the Editor, and he hopes soon to print in the MONTHLY WEATHER REVIEW the above mentioned memoir on the subject of clouds and their nomenclature, as read at the Springfield meeting of the A. A. A. S. in August, 1895. Meanwhile the following thoughts may be suggestive to those who are studying the local clouds in connection with the Daily Weather Map. The denser air that is near the ground on the northwest and west sides of a symmetrical circular area of low pressure pushes under the warmer, lighter air on the southeast and south sides; the latter is banked up and pushed eastward, and being lifted up overflows, mostly toward the east, but a little toward the west. The heavy rains on the south and east sides of the low locate the region where the uplifted air is piled up highest and forms the thickest cloud layer; immediately below these rain clouds the wind is still from the southeast and south, but the clouds themselves are flowing from some point between the south and west. This cloud layer from the southwest is flowing over a lower wind from the south or east, or even northeast, and, therefore, the

interference of these currents at the intermediate surface breaks up the lower surface, or perhaps even the whole of the horizontal wedge of descending stratus, into rolls (or cumulostratus stretching horizontally in imitation of rolls) whose axes stretch from some northerly point to the opposite southerly point; the exact trend depends upon the relative strength of the upper and lower current. If the lower is the stronger, the trend will be southeast rather than southwest, and as stronger winds are nearer the lowest pressure, therefore the trend will vary with the distance from the center of low pressure around which these winds and clouds are circulating. If this center is near at hand and bears northwest from the observer, and if it is moving eastward, and especially if the observer's wind is south and the lower cloud motion from the southwest while the trend of these cloud rolls, or the perspective vanishing point of the parallel striæ on the lower surface of the sheet of stratus above the observer be east and west, then the region of heavy cloud and rain will probably not move or extend southward to his station, but passing eastward, will probably keep to the north of him. If the barometric depression is a long trough, these relations are modified and the rain may reach him. If the trend of the axes of the rolls is from southwest to northeast and is then soon observed to change so as to become northwest and southeast, this indicates that the clearing region is rapidly approaching with its cooler air and that there is less prospect of rain.

But as these phenomena are affected by the topography of of the surrounding country, therefore such rules for Washington may not apply strictly to another locality, and the Editor will be pleased to publish such rules as others may have deduced.

HOAR FROST ESPECIALLY RICH IN NITROGEN.

(Translated from A. LANCASTER in Ciel et Terre, XVII, p. 54.)

Messrs. Petermann and Graftiau in a memoir, published by the Academy of Sciences of Belgium, and entitled Researches on the Composition of the Atmosphere, demonstrate the special richness of hoar frost in nitrogenous compounds, and draw attention to the important part that hoar frost plays in adding to the stock of nitrogenous matters in the forest, as well as to the purifying influence that the forests exercise on atmospheric air.

The truly remarkable richness of hoar frost merits attention as one of the interesting points in the complicated mechanism of the circulation and distribution of nitrogen throughout the world. The frost work which is attached to the branches of trees presents to the air, which surrounds it and is continually renewed, a large surface for the absorption of all the soluble bodies that it carries, and the isolated trees, the plantations, and the forests act like immense filters purifying the air that circulates through their foliage, robbing it of those nitrogenous combinations which, being returned to the soil by a thaw, serve again as nutriment to the plants and thus reenter the vital cycle. When one sees the branches of the trees bending under the weight of the frost, when the latter accumulates to the point of breaking the larger branches, we should recognize that this represents an appreciable factor in the stock of nitrogenous material accumulated in the forests.

The following analyses of one liter of melted frost collected at Gembloux, Belgium, are given in the above work:

	Milligrams of nitrogen.
March 1, 1889	5.86
January 2, 1890	7.70
December 31, 1890	9.00
December 31, 1890	8.00
December 31, 1890	7.02
Average	7.52

During the severe cold of the winter 1894–95, M. Graftiau made some further measurements for the purpose of also taking account of the quantity of frost actually attached to the branches. On February 7, between 9 and 10 a. m., and at a temperature of 16° C. below zero (plus 3.2° F.) he collected the frost attached to different species of trees growing in the arboretum of the agricultural institution at Gembloux. The branches that were heavily ladened with frost were gently detached and then shaken over a sheet of paper. The frost was then collected in a dish and weighed. In this way we could only obtain a part of the frost, therefore, the figures cited below are the minima. The quantities obtained were as follows:

Species.	Weight of—		Surface of branch.
	Frost.	Branches.	
	Grams.	*Grams.*	*Sq. cm.*
Cornus sanguinea	2.0	2.0	30
Populus alba	2.8	3.6	38
Ribes saxatile	5.5	2.5	100
Salix alba	34.1	15.0	203
Salix vitellina	39.3	32.1	270

Graftiau also weighed the frost on an entire shrub (*betula rotundifolia*). The cube limited by the extremities of the branches was about 1.5 meters on a side; the weight of the frost was 1.755 kilograms. The melted frost was analyzed and each liter contained: 4.0 milligrams of nitrogen as ammonia and 1.2 milligrams of nitrogen as nitrates and nitrites, or a total of 5.2 milligrams of combined nitrogen.

This frost of February 7 was not at all remarkable, and yet we see that its weight exceeded 1 kilogram for each cubic meter of space occupied by the branches. In mature forests the branches occupy, at a low estimate, a space of about 100,000 cubic meters to the hectare, and can, therefore, collect 100,000 kilograms of frost which represent, approximately, half a kilogram of combined nitrogen, if we adopt as the base of our calculation the small amount of frost that collected on the branches during the severe frost of February 7. If, for an average, we take 7.5 miligrams instead of 5, the deposit would be nearly 800 grams of nitrogen to the hectare, or 7 pounds to the acre.

Frost is sometimes formed to an extraordinary amount. It is then capable of breaking by its own weight branches that are 10 centimeters in diameter, which happened some years ago in different parts of the country. Therefore, the quantity of nitrogen that is given to the soil by the frost that falls on it is very considerable.

These authors, therefore, have with good reason said that the frost represents an appreciable factor in the reserve of nitrogen within forest areas. If we add to this the nitrogen contained in the rain, the dew, and the fog, we can easily explain why, without any artificial addition of nitrogen and without the intervention of those plants that serve to fix atmospheric nitrogen, the forest vegetation is always well supplied with nitrogen, and it also shows how the soil of forest areas grows richer in this element which is given to it by the detritus, or the waste of the forest.

[May we not also suggest that the stunted foliage on the summits of mountains, fed as it is by the melting of frost and snow, may be peculiarly well supplied with nitrogen.—C. A.]

ATMOSPHERIC REFRACTIONS AT THE SURFACE OF WATER.

In response to an inquiry about mirage, the Editor has collected the following notes from recent publications:

Prof. Charles Dufour of Lausanne communicated to the Academy of Sciences at Paris a memoir, of which Mr. Lancaster (*Ciel et Terre*, April, 1896, Vol. XVII, p. 88) gives the following summary—

Abnormal refractions are often observed on Lake Leman [*i. e.*, Lake Geneva, Switzerland]. If the air is colder than the surface water we have conditions favorable for mirage; the path of the curved

ray of light turns its convex side toward the water and mirages are formed as beautiful as any that occur over a desert. On the contrary, if the air is warmer than the water then the path of the ray of light turns its concave side toward the water and we then see distant objects that are ordinarily concealed by the rotundity of the earth, *e. g.*, the curved surface of the lake or of the ocean. In this latter case, for example, the Chateau of Chillon can be seen from Morges, distant 35 kilometers. Under normal conditions as to the temperature of the air the chateau is concealed by the curvature of the lake and would be so even if its height were doubled. It follows, from this, that if the air is colder than the water, which is generally the case in winter, the visible or apparent horizon line appears depressed by a quantity greater than the average depression; on the contrary, when the air is warmer than the water, which often happens in the summer, the depression of the horizon is less than the average. The author (C. Dufour) inquires whether this cause of error is considered when a navigator at sea observes the altitude of the sun above the horizon in order to determine the latitude or time. If he does not, this omission must cause appreciable errors in the computed positions of vessels on the ocean. According to observations made at Morges, it is certain that this difference of temperature at the point where the tangency to the surface of the water occurs sometimes produces errors that exceed five or six minutes of arc in the apparent altitude. He thinks that tables correcting for this error should be prepared.

Although this abnormal refraction is not vitally important in navigation, owing to many other sources of errors that affect the determination of the position of the vessel at sea yet, from a meteorological point of view, it is always important to understand the minutest details of what is going on in the atmosphere. The phenomena of the mirage here alluded to occur on the Great Lakes of North America in all their intensity in the summer season, and it is well for the observer to bear in mind the simple rule that when the mirage brings to his view objects otherwise invisible it proves that the temperature of the air through which the lowest part of his line of sight is passing is higher than that of the layer just below it, as the latter is cooled by contact with the cold water. When a slightly denser mass of air descends to the surface of the land or water, and, rolling along, finally spreads as a cool layer over the heated surface it temporarily breaks up the mirage due to hot air and substitutes that due to cold air, but in doing so both air and water are slightly agitated and this agitation produces the beautiful fleeting mirage called "fata morgana." Such phenomena must be very frequent on our American lakes, both large and small, and the Editor would be glad to have some account of them and a comparative study based on the current daily Weather Map.

In continuation of the above subject Prof. F. A. Forel communicated to the Paris Academy of Sciences (*Paris Comptes Rendus*, July 20, 1896, CXXIII, p. 161) the following note on the refractions and mirages on Lake Geneva:

The opposite types of refractions to which the rays of light are subjected when they graze the surface of the lake depend upon the relative temperature of the water and the air in contact with it. They are:

(1) The *refraction above warm water*, when the air is colder than the water. These refractions are characterized by the contraction of the horizon from all sides toward the center, by the exaggeration of the apparent curvature of the spheroidal surface of the lake, by the appearance of extraordinary denticulations or waves at the horizon line, finally, by the formation of a symmetrical mirage below that which we call the caustic plane; this mirage offers an apparent reflection of objects situated beyond the circle of the horizon, and is, therefore, the so-called mirage of the desert.

(2) The *refractions above cold water* when the air is warmer than the water. These are characterized by the enlargement of the circle of the horizon, the appearance of greater concavity which is assumed by the spheroidal surface of the lake, the elevation of the apparent horizon, the visibility of very distant objects that are really hidden by the rotundity of the earth, finally, the vertical shortening of objects that are very low down on the water and at a great distance.

(3) Between these two opposite types there are other special apparitions known under the name of fata morgana, fata brumosa, and, finally, the still unexplained phenomenon of the mirage over cold water, which occurs whenever the temperature of the air rises steadily above the temperature of the water. The mirage above cold water has the same characteristics as the mirage due to refraction above warm water, except that the lower image is not symmetrical, it is indeed inverted as to the real image, but it is greatly reduced in its vertical dimensions, often it has not a third of the height of the real object (See F. A. Forel, *Le Leman*, 2d volume, Lausanne, 1895.)

I have endeavored to precisely describe the conditions under which these various types appear. This is the result of very many observations, made for the most part on Lake Geneva. In order to simplify I will take my examples from a day in spring. At this season the temperature of the air runs through all possible variations with respect to the temperature of the water, and every type of refraction can appear in succession. In the morning, let us say at 6 a. m., the air cooled during the night is colder than the water of the lake. We then see the refractions and mirages over warm water. Toward 10 a. m., or noon, the temperature of the air rises, then it equals and finally exceeds that of the water, then we have the mirage over cold water. In the afternoon, between 2 and 4 p. m., suddenly the refractions change their character; the convexity of the lake is transformed into an apparent concavity; we see then the apparition of the fata morgana and sometimes that of the fata brumosa which persist for a few minutes only. I think I have proven that the appearance of the palaces of the fata morgana are only seen in all their beauty when a slight breeze passes over the lake after a morning of perfect calm.

Then suddenly we change. As soon as the fata morgana has disappeared the refraction over cold water takes possession of the scene and lasts until nighttime. The series of refractions is, therefore, as follows: (1) Mirage over the warm water; (2) mirage over cold water; (3) fata morgana; (4) refractions over cold water. The fata morgana occupies only a limited segment of the circle of the horizon; on one side of its fantastic apparitions we see the régime of the mirage over cold water, on the other side the refractions over warm water without mirage.

A further contribution to this subject will be found in a note by M. Andre Delebecque (*Paris Comptes Rendus*, August, 1896, CXXIII, p. 387) "On the extraordinary refractions observed on the borders of lakes and known by the name of fata morgana." He says:

In general this phenomenon is characterized by the fact that objects situated on the opposite shore of the lake seem to be distorted in an extraordinary way in a vertical direction; the rocks, the walls, and the houses appear to be transformed into immense constructions, out of which the imagination of the Italians has evolved the palaces of the Fairy Morgana. The fata morgana are extremely fleeting phenomena and do not generally last more than a few minutes. When they disappear the object whose vertical dimensions had been so magnified often assumes extraordinarily small proportions. As both Mr. Ford and myself have observed, the fata morgana occupies only a very limited and perpetually changing segment of the horizon, and quite near to it entirely different refractions frequently take place. On Lake Leman I have only observed them in calm weather and when the temperature of the air is notably warmer than that of the lake. They are most beautiful in the months of March, April, and May.

Many scientists, among whom I may cite Humboldt, Woltmann and Charles Dufour, have spoken of the fata morgana, but up to the present time, as far as I know, no one has given a satisfactory explanation of it, for when the air is warmer than the water of the lake, we sometimes observe the fata morgana, but more often the mirage known under the name of "mirage over cold water" and which has been so well studied by Bravais (see Bravais, *Notice sur le Mirage, Ann. Met. de France*, p. 256, 1852). In this latter mirage distant objects have their vertical dimensions much reduced. It seems singular that the same thermal conditions should produce two mirages so diametrically opposite to each other. The following is, I believe, the correct explanation of this apparent anomaly:

Many times when viewing the fata morgana through a powerful glass I have observed that the objects are not really increased in size, but that the impression is produced by the superposition of several images of the same object, sometimes upright, sometimes upside down. I have counted as many as five of these images. As they are generally very close together and sometime encroach one upon the other, it is very difficult to separate them by the naked eye, and therefore the illusion of an enlarged object is produced. Sometimes one portion alone produces many images. Thus, I have sometimes seen boats with two hulls, while the sails looked perfectly natural; a few minutes later only one hull remained, but the sails appeared gigantic.

It seems to result from these observations that the fata morgana is nothing more than a mirage of multiple images.

Mathematical analysis can, however, explain the facts observed.

In his memoir on the mirage, Bravais (see Bravais, *Notice sur le Mirage, Ann. Met. de France*, p. 264,) proves the possibility of three images being produced in the case where a layer of warm air flows more or less suddenly over a layer of cold air and when the subsequent calmness of the atmosphere allows these two layers to remain for some time in that position. But these are precisely the conditions existing during the apparition of the fata morgana, since it is necessary, as I said above, in order to produce this phenomenon that the air be very calm and perceptibly warmer than the water. The existence of three images is a particularly simple occurrence in the fata morgana. I

have tried to explain, by analysis, the production of the five images observed by me, but was obliged to give it up on account of the complexity of the calculations. In the case of three images, Bravais also shows how only certain parts of an object can produce multiple images; this phenomenon actually occurs as we have seen above.

Finally, if we reflect that two layers of air of very different densities cannot remain for a long time superposed one upon the other without becoming mixed, we shall understand the instability of the phenomenon and why the fata morgana and the mirage on cold water can succeed each other so rapidly in the same part of the lake.

An excellent description of the fata morgana as seen from Reggio, on the Italian coast, when looking toward Messina across the Straits of Messina, is given by Mascart in the third volume of his Treatise on Optics, Paris, 1893. In this volume (pages 305–338) he also gives a complete elucidation of the optical principles involved in every form of mirage, including even the triple images of vessels in the distant horizon, the multiple images observed by Arago and Biot, and every form of fata morgana. Mascart's formula seems to us applicable to all the cases enumerated in the above quotations.

AN EXPERIMENTAL RAINFALL.

A letter of June 20 from Prof. L. Errera, of Brussels, is published in *Ciel et Terre* for August, 1896, XVII, p. 353, giving the following description of an experimental study into the formation of clouds, which will, we hope, attract the attention of physicists who are conducting advanced courses in meteorology in American colleges and universities. The experiment has been repeated at the Weather Bureau with success, but it should be carried out on a large scale, with a very tall jar and great care as to uniformity of temperature, if one desires to get satisfactory results. Probably the clouds can be photographed by using a flash light and with care in the illumination. Other liquids, such as ether, benzine, turpentine, and water, should also be tried:

Take a cylindrical vase of bohemian glass of about 20 centimeters in height and 12 in diameter and fill it half full of strong alcohol—92 per cent—and cover it with a porcelain saucer and warm it over the water bath. It is necessary to warm it up for quite a long time, in order that the liquid and the whole vase and the porcelain cover may attain a high temperature and be in thermal equilibrium among themselves, but without bringing the alcohol to the boiling point. Remove the whole from the warm place and, being careful not to agitate the liquid, place the vase upon a wooden table and observe it carefully. The warm liquid continues to send up an abundance of alcoholic vapors. After some minutes the porcelain cover is sufficiently cooled so that these vapors commence to condense in its immediate neighborhood. Soon there are thus formed clearly visible clouds, and these in their turn resolve themselves into very fine droplets of rain, which fall steadily, vertically, and in countless numbers into the liquid. The droplets, when measured by means of a horizontal microscope, have an average diameter of from 40 to 50 thousandths of a millimeter; they are sometimes larger but more frequently smaller. This interesting spectacle may last for half an hour.

At first the vapors rise quite up to the porcelain cover, but in proportion as the whole system cools down the level where the condensation occurs naturally lowers more and more, and now we find a perfectly clear zone above the zone of clouds. We have in this way in miniature the whole aqueous circulation of the atmosphere; the evaporating liquid represents the ocean, far above it the cooling porcelain saucer is the pure sky, below this the clouds, which resolve themselves into real water, and the latter returns to the ocean. Except that in place of water everything is made of alcohol.

It would be surprising if this simple phenomenon has never been described before; but as you say that you do not remember to have seen an account of this anywhere in the meteorological literature, with which you are so perfectly familiar, I think it well to explain the conditions under which the phenomena are produced.

[The experiments here described by Errera may be compared with the well-known similar work of Tyndall and Aitken, especially those described by the well-known physicist of Edinburgh in his memoir entitled "On dust, fogs, and clouds." (Edinb. Transactions, 1880–81, XXX.) But Aitken makes use of complicated apparatus, while the experiments of Errera can be repeated at any time and in the simplest manner. Moreover, Errera describes very interesting phenomena that Aitken did not perceive, or, at least, has passed over in silence. Tyndall considers an analogous subject in his note "On the formation and phenomena of clouds." (Roy. Soc. London Proceedings, 1869, XVII.)—A. LANCASTER.]

Possibly this experiment may serve to explain some meteorological problems that are still under discussion; for example, whether the production of rain is necessarily subordinated to electrical influences, as is acknowledged by Clement Ley and many other authors.

Our experiment is, moreover, susceptible of several variations. After having taken the vase from the warm bath, if we replace the warm porcelain cover by a cold one the differences of temperature between different points of the system become greater and the phenomena are exaggerated; little whirlwinds, which are true squalls, are produced. When the alcohol is still very warm and if, by accident, the vase is a little warmer on one side than on the other, in that portion which is above the level of the liquid we see the alcoholic vapor performing a regular rotation about a horizontal axis; it continually rises along the warmer side of the vase and descends along the colder side. The proof that this rotation is due to the cause that I suggest is, that in order to reverse the direction of the rotation it suffices to cool the side of the vase along which the vapors are rising and this is easily done by the application of a strip of filter paper wet with cold water and frequently renewed.

At first thought the formation of cloud and rain in Errera's experiment where there can be no dust particles to serve as nuclei for condensation, seems to be contrary to Mr. Aitken's theory and experiments, according to which all ordinary rains and clouds depend upon the presence of dust nuclei; but there is really no contradiction. When air is cooled to a temperature near dew point, condensation begins where it is most easily possible, viz: first, on hygroscopic surfaces and next to this, on small particles of dust, many of which are also hygroscopic and, finally, on those that are smallest, even though they be not specially hygroscopic. If cooling proceeded only thus far, we should have dew, fog, and cloud, but no rain. If the process of cooling still continue then a certain critical stage is passed over and the aqueous molecules begin to agglomerate without waiting for the presence of nuclei; they come together in larger drops and by a more violent process. The extent to which cooling must proceed in order that this form of condensation may begin has been investigated, and may be defined as follows: If the cooling is produced by expansion, then the amount of expansion required in order to produce the second stage of condensation is 1.258 times the expansion necessary to produce the first stage of condensation. (See MONTHLY WEATHER REVIEW, May, 1896, page 167.) As long ago as 1841 Espy (see his Philosophy of Storms, page 35) observed the fact that when, by expansion, we determine the dew-point for a mass of air contained within a glass jar, several times in succession, the dew-point seems to be steadily rising. He says:

On comparing together the experiments made on dry air, there appeared but little discrepancy, but with moist air this was not so, and I was induced to institute a set of experiments to see whether length of time had any influence on the result. I, therefore, performed a great number of experiments similar in all respects, except the length of time which intervened between the time of pumping air into the nephelescope and of letting it out, and, to my astonishment, I found the rise of the mercury, after the discharge, constantly greater as the time was longer, up to about twelve or fifteen days; but beyond that time the effect did not seem to be increased. It follows from these experiments that when air saturated with vapor is confined in a glass vessel, air-tight, and containing a small portion of water, it will cease to be saturated to the amount of four or five degrees in the dew-point in fifteen days. Whatever may be the cause of this remarkable fact, so contrary to all our notions, since the experiments of Dalton on the subject of the dew-point, the following table of experiments proves beyond all doubt that it is a fact. Does water or glass so attract the particles of aqueous vapor as to condense some of these particles on them and bring down the dew-point four or five degrees below the temperature of the water and of the air included in the vessel?

The Editor can not doubt that Professor Espy was here in presence of the phenomenon that has subsequently been investigated by Barus and C. T. R. Wilson. By allowing his air to stand so long it had, by washing and settling, lost the greater part of its original dust. The dew-point determined by Espy, at the beginning of any experiment, corresponded to the first stage of cooling and the formation of fog on dust nuclei; but the dew-point determined by him a few days later in the same air when it had become dustless by settling

represented the second stage when the vapor particles must condense on themselves only, which process required a greater cooling and a greater expansion.

MEXICAN CLIMATOLOGICAL DATA.

In order to extend the isobars and isotherms southward so that the students of weather, climate and storms in the United States may properly appreciate the influence of the conditions that prevail over Mexico the Editor has translated the following tables from the current numbers of the Boletin Mensual as published by the Central Meteorological Observatory of Mexico. The data there given in metric measures have been converted into English measures. The barometric means are as given by mercurial barometers under the influence of local gravity, and therefore need reductions to standard gravity, depending upon both latitude and altitude; the influence of the latter is rather uncertain, but that of the former is well known. For the sake of conformity with the other data published in this REVIEW these corrections for local gravity have not been applied.

Mexican data for August, 1896.

Stations.	Altitude.	Mean barometer.	Mean temperature.	Relative humidity.	Precipitation.	Prevailing direction.	
						Wind.	Cloud.
	Feet.	*Inch.*	° *F.*	%	*Inch.*		
Colima (Seminario)	1,291.7	28.30	80.1	73	6.54	sw.	
Colima	112.2	.....	80.6	.....	.....	.....	
Guadalajara (Obs. d. Est.)	5,188.0	25.03	69.6	89	14.92	.....	e.
Guanajuato	6,761.3	23.74	67.8	53	3.76	ene.	ne.
Jalapa	4,757.3	25.61	68.0	67	8.62	n.	
Lagos (Liceo Guerra)	6,274.5	24.30	69.1	58	2.49	ne.	ne.
Leon	5,901.0	24.35	70.0	54	1.81	se.	e., ene.
Magdalena (Sonora)	.....	.....	82.6	.....	19.57	s.	
Mazatlan	24.6	29.91	84.7	77	3.38	nw.	ne.
Merida	50.2	29.97	81.1	78	7.83	ne.	e.
Mexico (Obs. Cent.)	7,488.7	23.12	63.0	65	2.56	nw.	ne.
Mexico (E. N. de S.)	7,480.5	23.11	63.1	65	2.56	.....	
Morelia (Seminario)	6,401.0	24.01	62.8	72	4.71	ssw.	e.
Oaxaca	5,164.4	25.11	73.0	61	2.39	nw.	ne.
Pabellon	6,312.4	.....	.....	.....	.....	.....	
Pachuca	7,956.3	22.59	57.9	66	0.27	ne.	ne.
Puebla (Col. Cat.)	7,112.0	23.43	67.1	55	2.29	.....	
Queretaro	6,069.7	24.23	68.5	62	2.00	e.	e.
Saltillo (Col. S. Juan)	5,376.7	.....	.....	.....	.....	.....	
San Luis Potosi	6,201.9	24.22	69.4	62	T.	ne.	e.
Silao	6,063.1	24.31	71.6	68	2.64	ne.	ne.
Tacubaya (Obs. Nac.)	7,620.2	.....	.....	.....	.....	.....	
Toluca	8,612.4	21.96	59.0	67	3.00	se.	e.
Trejo (Hac. Silao, Gto.)	.....	.....	.....	.....	3.20	.....	
Zacatecas	8,015.2	22.67	65.7	60	1.59	e.	e.
Zapotlan (Seminario)	5,124.8	25.11	70.7	.....	7.14	n.	n.e

UNRELIABLE POPULAR WEATHER PROVERBS.

Many persons still fail to realize the fact that the weather proverbs which pass down from generation to generation as unquestioned as are the nursery stories, belong to what may be properly called mythology. Like the myths and legends of ancient times they may, possibly, have had some slight basis of fact; they may possibly have applied satisfactorily to some far off period and some far distant land, or to one special occasion, but do not, necessarily, hold good to-day and in our own country. At a recent meeting of the Meteorological Society of France the members discussed the popular proverb: "When it rains on St. Medard's day it will rain for forty days unless fine weather returns on the day of St. Bernabe." M. Teisserenc de Bort showed that M. Lancaster, who, several years ago examined this question, found no results tending to verify this saying. M. Teisserenc de Bort has also studied the question as to whether it was possible to predict in advance a rainy period; thus in examining the data collected from 1863 to 1896, he finds that in the first days of June the rain is, on the average, a little more abundant, and diminishes toward the end of that month. But it was not observed that there was any systematic grouping of the days of rain around the day of St. Medard.

M. Renou said that M. Elie de Beaumont has called attention to the fact that the proverb relative to St. Medard dates from the middle ages, and that since then the order of the saint's days in the calendar has been changed, and that now the day of St. Gervais is the one to which the proverb should be applied. M. de Beaumont, therefore, examined the question of the grouping of days of rain according to the new date but did not find any verification of the proverb.

THE EFFECT OF SHADING THE SOIL.

According to Lancaster (*Ciel et Terre*, March, 1896, XVII, p. 22), some experiments have been made by A. Buehler, which may be summarized as follows: Four broad plats of ground were selected, situated near each other; one was left freely exposed to the sun and wind while the three others were shaded by horizontal wooden trellises placed around each plat and about 40 centimeters above the ground. The sunlight was cut off from the ground by the shadow of the trellis to a different extent for each plat, viz, one-quarter for plat No. 2, one-half for No. 3, and three-quarters for No. 4. In each plat, at 5 centimeters below the soil, a thermometer was buried; there was also placed in each plat an evaporometer and a vase of sheet iron filled with clay in which 1,000 grams of water had been poured. Observations were taken every three hours, with the following results: The shaded soil experienced less cooling by radiation at nighttime and less warming by sunshine in the daytime. The plat, No. 4, three-fourths of whose area was shaded, showed a temperature 10 per cent lower than the unshaded plat, No. 1; the lowering of temperature was most decided at noon and 3 p. m. As to the nocturnal cooling, the differences between the various plats were only 2° C. at the maximum, which explains why plants under a trellis are less exposed to frost than plants that are not thus protected. During rainy weather the differences in temperature were very small, rarely more than 1° C.; the shaded plats had a temperature a little higher than the unshaded, but during dry weather the shaded plats were warmed up more slowly. The relative evaporation from the plats was as follows: No. 1, unprotected, 100 per cent; No. 2, one-quarter covered, 88 per cent; No. 3, one-half covered, 71 per cent; No. 4, three-quarters covered, 62 per cent. Evaporation was most rapid from noon to 3 p. m. The observations all relate to a soil that is not covered with vegetation. If the soil had been cultivated the temperature and the evaporation would have been diminished still more.

A PRIZE FOR KITE FLYERS.

Owing to his great interest in everything bearing on aeronautics, Mr. Octave Chanute, of Chicago, recently authorized the Boston Aerohautical Seciety to invite competition for a special prize for the best monograph on the kite, giving a full theory of its mechanics and stability, with quantitative computations appended; the prize to be awarded by judges appointed by the Society. It was originally intended that the competition for this prize should close on November 15, 1896, but by a recent circular of November 23 we learn that the date has been postponed to January 1, 1897. Doubtless many of our readers will have interested themselves in kite flying for scientific purposes sufficiently to have, at least, thought of competing for this prize. The kite promises to become a very important factor in the exploration of the atmosphere and we shall all look forward with interest to the publication of that prize essay.

About 1880 the Editor found a lad in Washington who had kept his kite in the air continuously for the greater part of two days and could have kept it there for a week longer. Up to that time the Editor had used and thought of the kite only as a means of getting occasional records of the condition of the upper currents, but ever since that date he has

appreciated the possibility of getting long continued records from the upper regions.

DEATH OF AN OBSERVER.

In an official circular the Chief of the Bureau announces the death, on November 16, of Mr. Paul Daniels, Weather Bureau observer in charge of the station at Dubuque, Iowa. Mr. Daniels served continuously in the Signal Corps, and subsequently the Weather Bureau, from March 27, 1877, to the time of his death. His service was characterized by courage at isolated stations and by intelligent and faithful performance of important duties at populous centers.

Mr. Daniels is very pleasantly remembered at the Central Office where he was employed for several years during the Signal Office régime. I think it was in January, 1884, that Lieut. John P. Finley was assigned to the Study Room with instructions to carry on his tornado studies in that division and Mr. Daniels acted as his clerk. Finley, as we all know, was a hard worker, and he liked Daniels because the latter was not a whit behind him. In the course of time the intensive study of tornadoes was stopped and, eventually, Daniels was sent to one of our most inhospitable stations where, after years of faithful service (that some would look upon as banishment) he contracted typhoid fever. He was but slowly recovering from this disease when Professor Moore ordered him to reestablish the station at Dubuque, Iowa. Here his real love of work overcame his discretion and his recovery, we regret to say, turned into decline. In him the service has lost a faithful worker and the citizens of Iowa one who was devoted to their best interests.

METEOROLOGICAL TABLES.

By A. J. HENRY, Chief of Division of Records and Meteorological Data.

For text descriptive of these tables and charts see p. 16.

TABLE I.—*Climatological data for Weather Bureau Stations, October, 1896.*

Stations.	Elevation above sea-level, feet.	Length of record, years.	Pressure in inches. Mean pressure, 8 a. m. and 8 p. m. +2.	Mean reduced.	Departure from normal.	Temperature of the air, in degrees Fahrenheit. Mean max. and min. ÷2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.	Humidity and precipitation. Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.	Departure from normal.	Days with .01 or more.	Wind. Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Direction.	Date.	Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Monthly temperature data since opening station. Absolute maximum.	Year.	Absolute minimum.	Year.
New England.						49.2	— 1.6										4.19	+ 0.2													
Eastport	76	24	29.93	30.02	+ .01	46.5	+ 0.2	59	16	52	31	26	42	19	40	82	6.27	+ 2.2	14	9,111	s.	58	s.	24	1	15	15	7.2	80	1879	24	1891
Portland, Me	103	25	29.90	30.00	— .04	46.1	— 0.9	70	1	59	30	26	40	21	40	82	3.19	— 0.7	15	5,852	n.	34	s.	21	5	5	21	7.5	83	*	26	1889
Northfield	872	10	29.11	30.06	+ .02	42.5	— 1.6	64	30	51	20	26	34	31	36	82	2.42	+ 0.1	16	5,498	n.	34	se.	20	4	9	18	7.4	83	1891	12	1889
Boston	125	26	29.90	30.04	— .02	50.2	— 1.3	76	31	57	33	26	44	23	41	74	3.15	— 1.2	16	8,603	w.	50	ne.	12	8	6	17	6.9	90	1881	25	1879
Nantucket	14	10	30.01	30.02	— .06	51.5	— 2.3	68	1	56	39	26	48	17	48	86	6.03	+ 1.1	17	11,074	ne.	60	ne.	12	11	6	14	5.6	70	1890	35	1888
Woods Hole	.....	19	.....	.....	.....	51.0	— 2.6	67	31	55	34	25	47	15	.....	.....	4.53	+ 0.5	10	11,822	ne.	45	w.	24	13	4	14	5.4	77	1879	31	1891
Vineyard Haven	.....	10	.....	.....	.....	53.1	0.0	70	31	59	36	30	48	22	.....	.....	5.82	+ 1.5	11	.....	ne.	.....	.....	.....	...	7	5	19	.....	80	1890	32	1891
Block Island	27	17	30.00	30.03	— .08	52.3	— 2.0	69	31	56	38	25	48	14	47	82	5.26	+ 0.8	10	15,715	ne.	78	ne.	12	9	14	8	5.7	75	1881	33	1884
Narragansett Pier	.....	15	.....	.....	.....	49.2	— 3.1	69	*	56	28	26	43	27	.....	.....	3.29	— 1.3	9	.....	ne.	.....	.....	.....	...	7	5	19	.....	79	1884	25	*
New Haven	107	24	29.92	30.04	— .04	49.8	— 2.5	75	31	57	31	30	42	27	42	81	2.91	— 1.1	13	7,328	n.	41	ne.	12	9	6	16	6.2	86	1881	24	1879
Mid. Atlan. States.						54.2	— 3.0										1.76	— 1.5													
Albany	85	23	29.97	30.07	.00	48.4	— 2.9	67	31	56	29	23	41	28	41	81	1.53	— 1.7	14	5,401	n.	25	se.	20	8	3	20	6.9	86	1891	23	1876
Binghamton	875	.....	.....	.....	.....	46.4	.....	72	29	54	25	10	38	34	.....	.....	3.63	.....	12	4,124	nw.	25	s.	20	5	6	20	7.4	.....	.....	.....	.....
New York	314	26	29.71	30.05	— .04	51.9	— 4.1	72	31	58	36	19	46	25	44	79	1.71	— 1.8	11	10,542	nw.	45	nw.	24	5	11	15	6.4	88	*	31	1876
Harrisburg	377	9	29.67	30.09	— .00	50.9	— 1.6	71	29	58	32	9	44	30	41	74	3.45	+ 0.4	10	4,916	nw.	37	nw.	7	10	7	14	5.6	85	1891	28	1893
Philadelphia	117	26	29.94	30.06	— .05	53.6	— 3.0	74	31	60	37	*	47	23	44	73	2.08	— 0.8	7	7,618	n.	38	n.	12	9	7	15	6.1	87	*	31	*
Baltimore	123	26	29.93	30.06	— .05	54.8	— 3.2	77	31	63	36	25	46	27	41	66	1.11	— 1.9	6	3,589	n.	19	n.	12	12	9	10	4.6	89	*	30	*
Washington	112	26	29.96	30.08	— .04	54.0	— 3.3	76	31	64	31	26	44	26	43	73	0.34	— 2.7	7	4,988	nw.	28	nw.	21	15	6	10	4.6	92	*	26	*
Cape Henry	.....	23	.....	.....	.....	59.4	— 3.6	77	30	66	45	30	53	26	.....	.....	2.42	— 1.4	9	.....	sw.	.....	.....	.....	...	12	5	14	.....	89	*	35	1891
Lynchburg	685	26	29.36	30.11	.00	55.7	— 2.6	77	29	66	31	19	46	32	44	73	1.07	— 2.2	6	2,834	nw.	24	nw.	18	17	5	9	4.1	91	1884	28	1879
Norfolk	57	26	30.01	30.07	— .04	59.0	— 3.0	77	30	66	42	19	52	26	50	79	2.15	— 1.7	8	6,382	p.	30	ne.	10	14	4	13	5.3	89	1884	31	1876
S. Atlantic States.						63.5	— 1.7										2.42	— 1.6													
Charlotte	773	17	29.25	30.07	— .04	59.0	— 2.0	80	1	69	34	19	49	28	45	67	0.98	— 2.7	6	4,576	ne.	25	s.	30	13	12	6	4.1	92	1884	30	1879
Hatteras	11	16	30.04	30.05	— .04	63.0	— 2.3	76	30	68	50	19	58	21	57	84	5.28	— 0.9	12	10,856	ne.	67	n.	11	10	12	9	5.4	90	1881	42	1887
Kittyhawk	9	21	30.03	30.04	— .02	60.2	— 4.2	76	30	66	46	19	55	21	55	83	5.59	+ 1.9	8	12,589	ne.	72	ne.	11	15	9	7	4.3	90	1881	38	1876
Raleigh	375	10	29.69	30.09	— .02	58.8	— 1.4	78	21	68	36	19	50	32	47	73	2.07	— 2.8	6	4,136	n.	24	n.	10	8	13	10	5.2	88	1891	31	1893
Wilmington	78	26	29.98	30.07	— .03	61.7	— 3.0	80	1	70	42	19	54	29	53	81	4.08	+ 0.2	10	6,353	ne.	30	ne.	10	15	10	6	4.3	92	1884	32	1876
Charleston	52	26	30.03	30.08	— .02	66.7	— 1.0	85	1	74	50	19	60	24	56	78	1.38	— 2.8	7	6,184	ne.	33	ne.	10	12	11	8	4.7	93	1883	39	1873
Columbia	.....	10	.....	.....	.....	63.3	— 0.8	85	1	75	36	19	51	39	.....	.....	0.42	— 1.8	3	.....	ne.	.....	.....	.....	...	15	9	7	.....	92	1895	32	1891
Augusta	180	25	29.87	30.06	— .03	64.4	— 1.3	84	1	76	38	19	53	38	51	72	0.40	— 2.1	2	4,028	w.	22	ne.	10	17	5	9	4.1	94	1884	29	1873
Savannah	98	26	29.96	30.07	— .04	67.4	— 0.3	86	31	77	47	19	58	30	58	80	0.99	— 2.6	7	5,979	n.	27	n.	9	15	8	8	4.2	92	*	37	1873
Jacksonville	43	26	29.99	30.04	— .03	70.4	— 1.1	87	1	80	50	19	61	27	60	79	3.03	— 2.2	8	4,930	ne.	26	ne.	9	13	12	6	4.6	92	1884	40	1887
Florida Peninsula.						76.3	— 0.5										2.27	— 2.6													
Jupiter	38	9	29.98	30.01	+ .01	76.0	— 1.7	88	24	81	58	16	70	19	67	78	5.98	— 3.2	15	6,816	ne.	29	n.	20	6	15	10	5.9	90	1893	48	1890
Key West	22	26	29.99	30.01	+ .02	79.8	+ 0.8	88	25	84	71	16	76	10	71	76	1.93	— 3.3	9	6,995	ne.	32	sw.	17	12	12	7	4.8	92	1876	59	1892
Tampa	36	7	29.99	30.03	— .02	73.2	— 0.6	87	*	82	56	16	65	24	64	80	1.00	— 1.2	5	3,998	n.	20	nw.	14	16	10	5	3.8	90	1890	45	1892
East Gulf States.						67.6	— 0.7										4.46	+ 1.6													
Atlanta	1,131	19	28.88	30.08	— .06	61.4	— 0.8	79	6	70	40	18	52	26	47	65	1.28	— 1.0	7	7,132	nw.	31	n.	14	15	9	7	4.2	91	1884	30	1887
Pensacola	56	17	29.97	30.03	— .05	69.3	— 0.4	86	1	77	48	19	62	28	58	73	6.86	+ 3.5	10	6,804	n.	36	sw.	23	10	8	13	5.5	93	1884	38	1887
Mobile	57	26	30.02	30.08	.00	67.8	— 0.9	89	3	77	45	19	59	28	57	77	4.31	+ 0.9	7	4,837	n.	32	s.	23	11	6	14	5.7	93	1884	34	*
Montgomery	221	25	29.82	30.06	— .04	66.0	— 1.0	86	2	76	41	19	56	36	51	67	1.02	— 1.3	6	4,140	ne.	23	sw.	30	13	12	6	4.5	96	1884	31	1873
Vicksburg	254	26	29.77	30.04	— .07	65.7	— 1.3	87	2	76	43	18	55	35	53	74	3.60	— 1.0	9	4,115	n.	28	w.	29	17	7	7	4.2	94	1884	34	1887
New Orleans	54	26	29.99	30.05	— .01	70.4	— 0.3	91	3	78	54	*	63	25	59	76	5.33	+ 2.2	9	5,784	ne.	54	n.	37	9	5	17	6.3	91	1896	40	1873
Port Eads	.....	9	.....	.....	.....	72.9	— 0.3	87	31	78	58	*	68	23	.....	.....	8.79	+ 5.4	9	.....	n.	.....	.....	.....	...	3	13	15	.....	.....	.....	.....	.....
West Gulf States.						66.4	— 1.4										4.47	+ 1.6													
Shreveport	249	26	29.78	30.05	— .04	65.5	— 1.5	88	2	75	46	18	56	29	55	77	5.64	+ 2.5	10	4,151	ne.	33	e.	20	9	12	10	5.1	95	1883	31	1873
Fort Smith	481	15	29.54	30.05	— .03	60.9	— 1.8	91	2	72	35	18	49	35	49	74	3.10	+ 0.3	8	4,431	e.	30	sw.	29	13	8	10	5.1	95	1884	28	1894
Little Rock	302	18	29.76	30.08	— .02	61.8	— 1.9	91	2	71	38	18	52	31	48	69	3.12	— 0.6	6	4,599	e.	24	sw.	29	11	11	9	5.1	91	1896	33	*
Corpus Christi	20	10	30.01	30.08	— .04	70.8	— 2.2	93	6	76	56	25	66	23	67	88	4.12	+ 1.9	12	7,501	n.	36	nw.	31	8	10	13	5.7	90	*	42	1894
Galveston	42	26	30.01	30.05	— .02	71.4	— 1.1	87	3	77	58	8	66	20	64	81	2.14	— 2.1	11	6,746	ne.	28	nw.	28	nw.	29	12	9	10	4.8	89	1890	45	1873
Palestine	510	15	29.52	30.06	— .03	66.4	— 0.3	92	3	77	45	18	56	33	55	76	7.16	+ 3.9	11	3,564	ne.	22	se.	28	6	14	11	5.9	97	1893	37	1888
San Antonio	704	18	29.31	30.05	— .02	68.2	— 1.0	87	3	77	50	25	59	29	58	79	6.04	+ 4.4	11	4,508	n.	30	se.	29	7	10	14	6.1	99	1877	39	1894
Ohio Val. & Tenn.						65.3	— 2.5										1.66	— 1.0													
Chattanooga	762	18	29.29	30.11	— .02	60.3	— 1.4	81	6	71	35	19	49	35	46	69	1.06	— 1.6	3	4,661	w.	40	s.	30	14	11	6	4.3	91	1884	27	1893
Knoxville	990	26	29.06	30.10	— .04	58.2	— 1.5	78	6	70	34	19	47	34	46	72	1.59	— 1.2	5	3,163	ne.	30	sw.	30	12	13	6	4.3	92	1884	25	1876
Memphis	399	26	29.65	30.08	— .03	62.0	— 1.0	85	2	72	40	18	52	29	47	65	1.49	— 1.3	5	6,085	nw.	36	sw.	30	12	13	6	4.3	92	1884	29	1878
Nashville	545	26	29.50	30.08	— .02	59.0	— 1.7	81	5	70	35	18	48	34	45	68	0.98	— 1.5	6	4,645	nw.	35	se.	29	18	9	4	2.9	92	1884	27	1887
Lexington	980	12	29.01	30.08	.00	54.4	— 2.8	77	29	64	30	18	44	32	40	66	1.27	— 1.4	8	7,836	ne.	48	sw.	30	13	12	6	4.4	88	1891	23	1865
Louisville	525	26	29.51	30.09	— .02	56.3	— 3.0	82	28	68	32	25	45	36	42	68	1.61	— 1.2	7	4,815	n.	31	sw.	30	18	6	7	3.6	90	1884	26	*
Indianapolis	823	26	29.20	30.08	— .02	52.2	— 1.8	78	28	62	29	19	42	32	40	68	1.65	— 1.2	6	6,499	nw.	44	sw.	30	19	6	6	3.5	87	1884	22	*
Cincinnati	628	26	29.42	30.10	.00	53.4	— 3.6	77	29	63	31	19	44	33	40	67	2.29	— 0.2	7	4,872	nw.	36	sw.	30	18	6	7	3.8	88	1884	26	1887
Columbus	834	19	29.20	30.09	.00	50.4	— 3.6	77	30	60	25	19	41	34	40	77	0.55	— 2.1	6	5,086	n.	38	sw.	30	12	8	11	5.8	87	1884	20	*
Pittsburg	842	26	29.19	30.10	+ .01	50.6	— 4.7	79	30	59	30	25	42	31	42	78	2.26	— 0.2	13	4,049	w.	23	sw.	30	11	10	10	4.7	91	*	20	1887
Parkersburg	638	9	29.41	30.11	+ .03	51.4	— 2.9	79	29	61	29	25	42	37	42	81	3.52	+ 0.4	12	3,448	ne.	36	sw.	30	12	9	10	4.8	86	*	20	1895
Lower Lake Region.						48.0	— 3.5										1.35	— 1.7													
Buffalo	768	26	29.23	30.07	+ .02	47.4	— 2.9	78	30	53	34	10	42	27	37	70	1.90	— 1.8	9	10,103	w.	48	s.	20	7	7	17	6.5	83	1879	24	1887
Oswego	335	26	29.67	30.04	— .02	47.0	— 2.3	78	29	53	30	26	41	30	38	74	1.45	— 1.8	13	7,121	se.	36	nw.	24	7	5	19	6.9	84	1877	24	1889
Rochester	523	26	29.49	30.06	.00	47.2	— 2.3	76	29	54	30	19	40	29	38	74	0.58	— 2.3	8	4,977	sw.	25	nw.	7	6	8	17	6.7	87	1879	19	1879
Erie	714	24	29.30	30.07	+ .01	48.5	— 3.8	78	30	54	32	19	43	24	38	69	2.01	— 2.1	11	6,994	nw.	36	se.	30	10	9	12	5.5	85	1879	23	1895
Cleveland	792	26	29.24	30.07	— .01	48.6	— 4.1	76	30	56	30	25	41	27	39	72	0.84	— 2.0	10	9,961	se.	49	nw.	6	13	7	11	4.8	87	1879	24	1887
Sandusky	629	20	29.39	30.07	— .01	49.4	— 3.9	75	29	56	28	25	41	32	39	72	1.14	— 1.6	10	6,534	nw.	33	n.	6	10	8	13	5.6	90	1891	24	1887
Toledo	674	26	29.34	30.08	+ .02	48.4	— 3.9	74	15	56	28	25	41	32	39	72	1.20	— 1.2	9	6,688	w.	36	sw.	30	14	8	9	4.6	86	1891	24	1887
Detroit	730	26	29.28	30.08	+ .02	47.6	— 4.7	74	15	55	30	19	40	31	38	74	1.65	— 0.9	8	6,805	sw.	36	sw.	30	17	6	8	4.2	85	1884	22	*
Upper Lake Region.						45.1	— 2.3										2.14	— 0.8													
Alpena	600	25	29.40	30.07	+ .04	42.8	— 2.5	65	30	50	25	17	36	23	36	83	0.84	— 3.0	10	6,737	nw.	28	se.	30	13	12	8	5.2	87	1891	15	1887
Grand Haven	628	26	29.36	30.05	+ .02	46.8	— 2.5	75	29	56	27	22	38	30	37	76	1.05	— 2.2	6	7,127	nw.	42	sw.	30	13	6	12	5.1	81	1891	20	1887
Marquette	734	26	29.20	30.00	.00	44.0	— 1.0	69	4	51	26	18	37	25	35	81	4.20	+ 0.9	15	7,397	nw.	37	s.	9	5	10	16	7.2	87	1879	12	1887
Port Huron	639	23	29.38	30.09	+ .04	46.7	— 2.6	73	15	54	25	19	39	33	38	77	1.25	— 1.5	7	7,918	nw.	36	s.	30	15	9	7	4.3	86	1879	19	1895
Sault Ste. Marie	624	9	29.34	30.03	+ .04	41.9	— 1.8	65	4	49	24	24	34	29	35	83	3.04	— 0.4	12	6,073	se.	31	nw.	15	10	11	10	5.5	77	1891	18	1895
Chicago	824	26	29.18	30.07	— .02	49.6	— 2.6	75	28	56	29	21	43	25	38	69	1.36	— 1.6	6	12,306	n.	62	s.	29	16	8	7	4.5	86	1891	14	1887
Milwaukee	673	26	29.33	30.06	— .02	46.8	— 3.0	74	28	54	26	21	40	24	40	85	1.02	— 1.3	6	6,983	n.	32	sw.	31	12	9	10	4.9	87	1891	14	1887
Greenbay	617	11	29.39	30.07	+ .01	45.1	— 1.9	71	14	54	21	18	36	32	36	79	3.13	+ 0.7	7	5,555	s.	30	se.	30	12	12	7	4.5	84	1891	8	1887
Duluth	702	26	29.24	30.02	+ .02	41.8	— 2.7	75	14	48	19	24	36	34	34	78	3.46	+ 0.9	11	7,744	ne.	55	ne.	30	9	12	10	5.6	80	1886	8	1887
North Dakota.						41.4	— 1.9										1.02	— 0.3													
Moorhead	935	16	28.99	30.04	+ .04	41.1	— 1.4	79	14	52	15	21	30	43	30	74	2.23	+ 0.3	7	7,779	n.	42	s.	3	8	10	13	5.8	84	1885	3	1895
Bismarck	1,674	23	28.82	30.08	— .08	42.0	— 2.0	77	1	54	13	20	30	45	28	66	0.48	— 0.6	5	6,102	nw.	37	nw.	4	20	6	5	4.0	88	1879	— 2	1895
Williston	1,875	18	28.64	30.07	+ .06	41.2	— 2.3	82	2	55	10	22	27	46	26	65	0.34	— 0.6	2	5,336	n.	30	n.	14	14	14	3	3.8	95	1879	— 3	1895
Upper Miss. Valley.						50.7	— 2.0										2.33	— 0.2													
Minneapolis	.....	7	.....	.....	.....	46.3	— 2.5	76	14	55	21	21	37	35	.....	.....	3.55	+ 1.4	10	.....	nw.	.....	.....	.....	...	15	5	11	.....	84	1892	16	1895
St. Paul	837	26	29.10	30.02	+ .01	45.5	— 2.0	75	14	55	21	21	36	39	34	70	3.39	+ 1.5	9	5,084	se.	36	se.	27	12	7	12	5.0	87	1879	12	1887
La Crosse	.....	24	.....	.....	.....	46.0	— 3.5	74	14	58	30	*	34	41	.....	.....	3.69	+ 1.4	6	4,975	s.	38	s.	30	14	10	7	4.8	84	*	6	1887
Des Moines	867	19	29.12	30.06	— .00	49.8	— 2.4	72	28	60	26	24	40	28	36	67	1.67	— 1.0	4	6,507	e.	38	sw.	30	16	8	7	4.6	87	1891	17	1887
Dubuque	650	24	29.33	30.04	— .01	50.6	— 1.2	75	2	62	26	*	39	35	37	68	2.69	— 0.4	6	5,548	n.	33	w.	30	19	7	5	3.2	87	1892	14	1887
Keokuk	614	26	29.38	30.05	— .02	49.0	— 1.8	74	14	59	24	21	39	35	37	73	2.56	— 0.2	4	3,002	s.	19	w.	31	13	12	6	4.4	87	1891	15	1887
Cairo	359	26	29.07	30.06	— .03	52.0	— 2.0	76	28	62	27	24	42	35	40	73	1.71	— 1.0	4	5,389	n.	36	sw.	30	19	7	5	2.9	90	1893	20	*
Springfield, Ill	644	18	29.36	30.06	— .03	52.6	— 2.4	78	28	62	30	21	43	33	40	69	1.73	— 1.0	6	5,282	se.	34	sw.	30	13	13	5	4.1	88	*	24	1873
																	1.76	— 0.9	6	6,406	nw.	36	sw.	29	14	10	7	4.2	88	*	20	1887

TABLE I.—*Climatological data for Weather Bureau Stations, October*, 1896—Continued.

Stations.	Elevation above sea-level, feet.	Length of record, years	Pressure, in inches.			Temperature of the air, in degrees Fahrenheit.								Humidity and precipitation.					Wind.					Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Monthly temperature data since opening station.			
			Mean pressure, 8 a. m. and 8 p. m. +20.	Mean reduced.	Departure from normal.	Mean max. and min. +2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Maximum velocity. Direction.	Maximum velocity. Date.				Absolute maximum.	Year	Absolute minimum.	Year
Up. Miss. Val.—Con																														
Hannibal	534	....	29.47	30.05	.....	53.0	.....	80	28	64	30	25	42	37	41	72	1.72	— 0.8	7	6,164	sw.	43	sw.	30	18	8	5	3.2	....	....	....	....
St. Louis	567	26	29.46	30.08	.00	57.2	— 0.8	80	28	67	36	24	48	33	43	68	1.20	— 1.7	8	7,659	se.	46	sw.	30	22	5	4	2.9	90	1879	24	1887
Missouri Valley.						51.2	— 2.4										2.48	+ 0.5													
Columbia	.....	8	.....	.....	.....	55.0	— 1.9	82	28	68	23	24	42	42	.....	.....	2.45	+ 1.0	7	5,927	w.	37	sw.	30	14	9	8	4.4	93	1896	19	1895
Kansas City	963	9	29.03	30.07	.00	55.0	— 1.5	86	1	66	31	24	44	34	43	71	2.99	— 0.3	6	5,794	nw.	31	sw.	29	20	4	7	3.1	90	1893	26	1895
Springfield, Mo	1,324	11	28.65	30.06	— .02	55.3	— 2.9	83	1	65	33	18	46	33	44	73	2.50	— 0.4	7	7,075	se.	36	w.	30	13	13	5	3.7	88	1893	21	1887
Topeka	.....	10	.....	.....	.....	55.8	— 0.9	91	1	68	32	24	43	41	.....	.....	3.34	+ 1.2	8	.....	s.	....	.....	....	15	11	5	....	91	1896	22	1887
Omaha	1,103	26	28.86	30.04	— .04	51.5	— 1.3	82	1	62	26	30	41	32	37	66	3.72	+ 1.2	10	5,348	n.	24	n.	29	15	7	9	4.4	89	1893	15	1878
Sioux City	1,165	8	.....	.....	.....	47.1	— 4.6	79	1	60	23	21	34	42	.....	.....	2.59	+ 0.9	6	7,466	se.	36	s.	9	16	5	10	4.5	90	1892	12	1895
Pierre	1,470	22	28.45	30.04	+ .01	46.5	— 3.0	80	3	60	18	20	33	49	30	62	0.55	— 0.1	4	5,597	se.	33	n.	3	13	10	8	3.5	98	1892	4	1895
Huron	1,310	16	28.63	30.06	+ .03	43.8	— 2.7	82	1	58	13	22	30	47	31	71	1.70	+ 0.4	5	8,686	nw.	47	se.	3	13	12	6	4.8	94	1892	3	1895
Northern Slope.						46.3	+ 0.2										0.68	— 0.1													
Havre	2,477	17	27.38	30.02	.00	44.8	+ 1.3	85	2	59	17	26	31	46	32	72	0.68	+ 0.1	3	4,310	sw.	25	nw.	5	19	10	2	3.7	89	1889	—16	1881
Miles City	2,372	19	27.49	30.01	— .03	46.0	— 0.1	86	2	60	16	29	32	47	29	57	0.62	— 0.2	2	4,006	n.	24	ne.	8	20	6	5	3.5	86	1896	— 5	1887
Helena	4,108	17	25.88	30.09	+ .03	47.9	+ 2.9	75	2	58	30	28	38	33	30	57	0.24	— 0.6	3	4,582	sw.	25	nw.	2	17	6	8	4.1	80	1889	3	1887
Rapid City	3,260	11	26.64	30.05	+ .01	47.2	— 1.6	82	3	60	24	23	34	39	30	60	0.68	0.0	4	7,222	sw.	36	nw.	19	15	11	5	4.4	96	1892	10	1895
Cheyenne	6,105	26	24.04	30.10	+ .03	46.0	0.0	75	3	60	23	29	32	43	25	52	0.28	— 0.4	2	6,640	nw.	37	nw.	29	14	11	6	4.5	83	1892	— 5	1878
Lander	5,372	14	24.70	30.13	+ .05	43.5	+ 0.5	79	2	59	10	29	28	44	25	57	0.74	— 0.2	3	1,819	sw.	32	se.	26	15	10	6	3.5	81	1889	10	*
North Platte	2,826	23	27.11	30.09	+ .03	48.4	— 1.8	88	1	64	30	11	32	48	31	63	1.51	+ 0.5	3	6,394	w.	31	nw.	29	20	8	3	3.4	89	1879	9	1887
Middle Slope.						54.0	— 1.4										1.79	+ 0.5													
Denver	5,290	25	24.77	30.08	+ .02	50.1	— 0.6	82	2	65	25	29	36	42	25	46	0.84	— 0.1	5	4,906	s.	32	nw.	30	13	13	5	4.1	90	1892	1	1873
Pueblo	4,713	9	25.30	30.06	+ .03	50.6	— 1.4	83	1	65	23	31	36	45	30	54	0.71	0.0	5	4,527	nw.	42	n.	28	16	5	10	4.7	87	1889	19	1895
Concordia	1,398	12	28.55	30.05	— .01	53.4	— 1.4	91	1	65	28	24	42	45	39	70	2.56	+ 1.0	7	4,454	s.	24	nw.	30	18	7	6	3.7	92	1887	20	1895
Dodge City	2,504	23	27.43	30.05	+ .02	54.2	— 1.6	90	1	68	24	11	40	43	37	66	2.45	+ 1.2	5	7,290	se.	36	s.	9	17	10	4	3.6	94	1889	10	1878
Wichita	1,351	9	28.61	30.05	+ .01	56.8	— 0.9	90	1	69	34	11	45	36	42	67	2.27	+ 0.5	6	5,647	s.	27	n.	10	18	9	4	3.8	91	1889	29	1895
Oklahoma	1,239	6	28.76	30.08	+ .02	59.2	— 2.3	91	2	70	35	11	48	33	45	68	1.91	+ 0.2	5	5,202	n.	26	n.	23	19	8	4	4.1	92	*	32	1893
Southern Slope.						58.2	— 2.8										3.64	+ 1.8													
Abilene	1,749	12	28.24	30.07	— .01	62.2	— 3.0	86	2	71	43	11	53	30	52	79	4.18	+ 1.8	14	5,471	s.	36	nw.	28	9	9	13	5.6	94	1893	34	1887
Amarillo	3,691	5	26.30	30.07	+ .01	54.2	— 2.5	82	1	64	33	29	44	34	43	75	3.09	+ 1.7	9	9,572	s.	46	w.	9	8	6	17	6.1	84	1893	31	1895
Southern Plateau.						64.4	+ 0.6										1.58	— 0.9													
El Paso	3,767	19	26.20	30.01	.00	62.4	— 1.3	86	1	73	40	31	51	32	46	66	2.02	+ 1.1	10	6,750	nw.	50	nw.	13	11	15	5	4.2	94	1879	28	1892
Santa Fe	6,998	23	23.30	30.05	+ .01	48.5	— 1.2	70	4	57	30	30	40	37	34	65	3.19	+ 2.2	13	4,153	se.	27	ne.	7	10	11	10	5.4	85	1878	16	1880
Phœnix	1,076	....	28.73	29.85	.....	71.0	+ 1.7	98	6	83	47	29	59	32	50	55	1.02	+ 0.4	6	3,201	s.	36	se.	1	19	8	4	2.7	....	....	.....	....
Yuma	139	22	29.69	29.83	— .08	75.5	+ 3.0	102	6	80	48	29	62	35	53	53	0.10	— 0.2	3	3,293	ne.	24	sw.	19	22	8	1	1.9	108	1887	41	1883
Middle Plateau.						52.2	+ 2.4										0.42	— 0.4													
Carson City	4,730	9	25.27	30.04	.....	51.0	+ 0.9	83	1	69	22	13	33	50	30	56	0.30	— 0.1	1	.....	ne.	....	.....	...	16	13	2	3.0	85	1889	20	1895
Winnemucca	4,340	18	25.68	30.03	— .04	51.1	+ 3.1	83	1	68	26	30	35	48	21	28	0.27	— 0.2	3	6,050	ne.	50	sw.	31	20	5	6	3.2	87	1889	10	1878
Salt Lake City	4,344	23	25.65	30.04	— .05	54.4	+ 3.2	82	2	66	33	29	43	31	34	49	0.70	— 0.8	4	4,234	se.	34	nw.	31	19	5	7	3.6	86	1889	22	1878
Northern Plateau.						49.7	+ 1.4										0.85	— 0.5													
Baker City	3,470	8	26.47	30.01	— .03	48.8	+ 1.2	81	1	63	24	28	35	42	30	55	0.31	— 0.8	5	4,402	s.	22	se.	10	13	10	8	4.2	85	1889	21	1890
Idaho Falls	4,742	7	25.27	30.08	— .01	45.9	+ 2.3	77	1	63	19	10	29	47	30	62	0.58	— 0.7	4	4,436	nw.	31	s.	31	23	1	7	2.8	80	1892	13	1895
Spokane	1,929	16	28.02	30.07	+ .01	49.8	+ 2.5	75	1	61	30	27	38	36	36	65	0.94	— 0.6	5	2,763	s.	30	se.	31	7	13	11	5.8	86	*	12	1887
Walla Walla	1,018	11	28.97	30.06	— .02	54.2	— 0.4	85	1	64	36	23	44	30	43	69	1.57	0.0	7	3,514	s.	26	sw.	2	14	14	3	3.8	86	1892	24	1887
N. Pac. Coast Reg.						52.6	+ 0.3										4.10	— 0.9													
Fort Canby	179	14	29.81	30.01	— .02	53.2	0.0	72	15	58	45	5	48	22	50	90	5.40	0.0	12	7,012	se.	66	s.	30	5	8	18	6.8	83	1895	38	1893
Fort Angeles	20	12	.....	.....	.....	48.0	+ 0.3	66	17	55	34	25	41	23	.....	.....	2.13	— 0.4	10	3,292	e.	24	w.	20	6	14	11	6.1	66	1896	28	1893
Seattle	119	....	29.90	30.03	.....	52.8	.....	69	1	60	37	26	46	26	46	81	2.49	.....	11	2,864	se.	30	se.	30	9	9	13	5.5	....	.....	.....	....
Tatoosh Island	86	14	29.92	30.02	— .01	50.2	— 0.2	60	*	54	42	24	46	14	45	84	6.79	— 1.8	15	7,953	e.	52	s.	30	6	7	18	6.8	72	1895	38	*
Astoria	.....	12	.....	.....	.....	54.2	— 0.6	70	15	60	45	29	48	30	.....	.....	6.44	— 0.2	13	.....	sw.	...	.....	...	12	5	14	....	76	1895	34	1893
Portland, Oreg	153	25	29.86	30.02	— .06	55.9	+ 1.9	78	15	65	40	10	47	29	46	73	1.76	— 2.3	9	4,859	nw	37	se.	30	16	11	4	4.3	83	1891	31	*
Roseburg	521	20	29.45	30.02	— .09	54.2	+ 0.4	80	1	67	32	25	42	39	43	73	2.06	— 0.7	8	1,653	nw.	20	w.	10	17	9	5	3.5	91	1885	22	1881
Mid. Pac. C'st Reg.						53.1	+ 0.6										1.58	— 0.4													
Eureka	64	10	29.98	30.04	— .02	52.6	— 0.5	70	10	59	42	10	46	28	48	91	2.37	— 0.1	8	3,454	nw.	30	nw.	4	7	17	7	5.4	82	1887	38	1893
Redbluff	334	20	29.58	29.93	— .08	67.2	+ 4.2	94	5	80	44	28	55	35	40	43	0.66	— 0.7	3	4,744	nw.	33	nw.	21	23	5	3	2.4	97	1892	32	1881
Sacramento†	71	20	[b]29.83	[b]29.90	[b]— .11	65.4	+ 3.7	92	6	78	44	30	52	35	46[b]	50[b]	0.55	— 0.4	2	5,716	n.	38	n.	22	19	9	3	2.8	98	1885	36	1881
San Francisco	153	26	29.81	29.97	— .05	58.8	— 1.0	85	5	66	47	14	52	27	50	82	1.55	+ 0.3	5	7,135	w.	35	se.	26	19	9	3	3.4	89	1894	45	1881
Point Reyes Light	.....	7	.....	.....	.....	53.8	— 1.2	74	1	58	45	*	50	33	.....	.....	1.76	— 1.0	5	.....	nw.	....	.....	...	14	8	9	....	.....	.....	.....	.. .
S. Pac. Coast Reg.						65.4	+ 0.9										1.18	+ 0.7													
Fresno	332	10	29.56	29.91	— .07	66.7	+ 0.7	94	2	81	43	26	52	39	44	50	1.28	+ 0.8	1	3,233	nw.	20	nw.	10	21	6	4	2.5	100	1887	36	1892 *
Los Angeles	330	20	29.57	29.92	— .06	65.4	+ 1.1	90	16	77	47	28	54	35	53	77	1.30	+ 0.6	3	2,724	w.	24	w.	27	15	14	2	3.2	102	1885	40	1892
San Diego	69	25	29.86	29.94	— .05	64.2	+ 0.9	79	16	70	52	30	58	20	57	81	0.97	+ 0.6	4	3,175	nw.	26	w.	27	22	1	8	3.1	92	1879	44	1878
San Luis Obispo	201	....	29.77	29.99	.....	62.2	.....	98	2	77	38	26	47	52	48	73	1.44	.....	1	3,085	nw.	24	w.	27	18	9	4	3.7	....	....	.....	....

NOTE.—The data at stations having no departures are not used in computing the district averages. Letters of the alphabet denote number of days missing from the record. *Two or more directions, dates, or years. †Received too late to be considered in departures, etc.

TABLE II.—*Meteorological record of voluntary and other cooperating observers, October, 1896.*

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Alabama.	°	°	°	*Ins.*	*Ins.*
Alco †	89	34	66.2	5.95	
Ashville *†	84	34	61.3	1.09	
Bermuda †	87	37	65.8	2.98	
Birmingham †	84	38	63.5	1.28	
Brewton †	90	33	64.5	5.00	
Bridgeport †				1.73	
Carrollton *†	80	40	63.4	1.94	
Citronelle †	86	48	68.5	5.11	
Clanton †	83	35	63.2	1.76	
Cordova †				1.64	
Daphne †	88	41	66.8	5.78	
Decatur †	81	33	58.4	1.06	
Demopolis †				2.02	
Elba †	93	31	66.0	2.19	
Eufaula *a †	84	42	66.6	2.68	
Evergreen †	87	35	64.7	3.40	
Florence *a †				2.08	
Florence *b †	83	33	60.0	1.83	
Fort Deposit †	85	38	64.9	3.33	
Goodwater †	89	40	64.8	1.05	
Greensboro †	86	42	64.9	2.55	
Hamilton †				4.37	
Healing Springs †	90	29	62.8	2.32	
Highland Home †	85	46	66.8	3.21	
Lock No. 4				1.71	
Madison Station †	81	31	58.4	1.29	
Marion †	83	44	64.4	2.00	
Mount Willing †	98	37	67.1	4.34	
Newbern †	85	40	65.2	2.18	
Newton †	89	36	65.6	2.51	
Oneonta † †	83	26	57.6	0.82	
Opelika †	89	41	64.8	1.02	
Oxanna †	80	34	61.8	1.53	
Pineapple †	90	37	68.2	2.66	
Pushmataha †	87	37	65.1	3.19	
Rockmills †	90	35	66.3	0.90	
Scottsboro †	85	34	60.7	0.96	
Selma †				1.28	
Talladega *†	85	38	62.2		
Tuscaloosa †	86	36	63.6	1.73	
Union †	90	29	65.4	1.76	
Union Springs †	82	42	65.2	2.99	
Uniontown †	87	46	67.0	1.95	
Valleyhead †	84	31	59.9	1.25	
Wetumpka				1.13	
Wilsonville †				1.10	
Alaska.					
Killisnoo †	52	30	42.0	10.55	
Arizona.					
Benson *§	87	47	68.4	8.80	
Bisbee †	80	39	61.8	7.82	
Buckeye †	97	49	73.3	2.00	
Calabasas †	85	45	65.0	2.53	
Casa Grande *§	96	52	72.0	1.85	
Dragoon †				5.10	
Dragoon Summit *§	82	47	63.3	4.45	
Eagle Pass *§		32	52.8	2.27	
Farleys Camp †	95	42	70.0	3.15	
* Fort Apache	83	27	54.2	2.42	
Fort Grant †	83	36	60.4	4.80	
Fort Huachuca †	85	34	59.6	3.86	
Gilabend *a *§	100	56	78.0	1.42	
Glendale	95	44	69.4	0.45	
Holbrook †	81	30	55.4	1.51	3.0
Ingleside	96	44	71.7	0.97	
Maricopa *§	101	54	77.1	0.41	
Mesa †	96	46	69.8	2.17	
Mount Huachuca	81	33	58.0	4.82	
Natural Bridge				4.30	
Oracle †	81	40	61.7	4.78	
Oro				4.30	
Oro Blanco	86	42	66.6	0.95	
Pantano *§	82	44	65.1	4.30	
Parker †	117	44	75.0	1.81	
Payson				4.62	
Peoria †	93	48	73.7	1.60	
Phœnix	98	44	68.9	1.15	
Pinal Ranch				3.42	
Reymert †	104	48	73.6	3.16	
San Carlos †	96	39	44.9	4.56	
San Simon *§	82	37	65.0	1.96	
Show Low				4.03	5.5
Signal †	98	44	69.2	2.80	
Sulphur Spring Valley †				3.59	
Texas Hill *§	108	60	80.1	0.00	
Tucson *c †	91	42	68.8	3.31	
Walnut Grove †				2.83	
Walnut Ranch *†	76	34	55.8	5.45	
Whipple Barracks †	87	28	54.6	3.67	T.
Willcox *§	80	42	61.7	3.17	
Arkansas.					
Amity	90	33	62.2	3.02	
Arkansas City †				2.80	
Beebranch † *	92	38	62.0	3.80	
Blanchard Springs †	89	35	63.3	6.67	
Brinkley †	89	40	59.6	4.35	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Arkansas—Cont'd.	°	°	°	*Ins.*	*Ins.*
Camden *a †				6.82	
Camden *b †	90	32	61.2	6.62	
Canton *†	89	29	56.8		
Conway *§	85	35	59.9	3.31	
Corning †	84	29	56.2	1.86	
Dardanelle †				3.20	
Elon †	98	34	65.6	4.30	
Emmet *†	91	39	63.3		
Fayetteville †	87	30	57.5	4.76	
Forrest †	89	32	61.2	3.42	
Fulton †				3.99	
Helena *a †				2.44	
Helena *b †	88	35	61.4	2.06	
Hot Springs *a	93	36	61.9	4.50	
Hot Springs *b				5.24	
Hot Springs (near)				4.49	
Jonesboro †	85	30	59.9	1.83	
Keesees Ferry †	89	25	57.6	3.99	
Lacrosse †		29		3.48	
Lonoke *†	89	38	62.2	2.56	
Luna Landing *§	82	42	62.9	3.34	
Lutherville *†	91	37	62.3		
Malvern †	92	36	61.3	5.64	
Marianna *†	86	40	62.0		
Marvell	88	36	62.4	1.50	
Moore				3.75	
Mossville	82	38	58.0	2.40	
Mount Nebo †	86	41	59.8	3.32	
New Gascony				3.33	
Newport *a †				2.47	
Newport *b †	90	29	59.0	2.39	
Newport *c †	91	29	59.7	2.07	
Oregon *†	82	34	55.0		
Osceola †	86	32	60.2	1.70	
Ozark †	91	37	61.6	2.57	
Picayune †	92	39	66.2	3.80	
Pinebluff †	94	40	63.1	4.09	
Pocahontas †	81	30	56.6	2.64	
Prescott †	94	35	64.8	4.95	
Rison †	88	37	61.7	5.43	
Silver Springs †	82	29	54.4	4.22	
Stuttgart †	87	32	60.8	3.36	
Texarkana †	93	37	65.2	4.48	
Warren †	90	34	63.2	5.28	
Washington *†	92	43	64.0	4.63	
Wiggs *†	88	35	64.0	3.63	
Winslow †	75*	35	55.1	7.01	
Witts Springs †	85	30	56.6	3.31	
California.					
Adin	84	25	52.2	0.55	
Agnew	86	38	59.6	1.66	
Arlington Heights	98	44	67.6	1.52	
Asti	92	50	63.7		
Athlone *§	98	40	66.9	0.81	
Azusa				2.93	
Ballast Point L. H.				0.59	
Barstow †	96	36	66.9	1.55	
Bear Valley †				2.57	10.0
Berkeley	82	47	59.5	1.91	
Bishop †	85[f]	31[f]	56.2[f]	T.	
Bishop Creek *§	87	40	59.4	T.	
Boca *§	82	20	47.3	0.00	
Bodie †	70	5	39.1	0.81	7.0
Bowmans Dam †				2.83	14.0
Caliente *§	98	47	68.4	1.02	
Calloway Canal †				0.64	
Cape Mendocino L. H.				2.44	
Cedarville †	81	26	51.0	1.12	
Centerville *†	94	50	62.5	1.22	
Chico *§	94	44	65.4	0.52	
Chino *†	96	44	66.2	1.12	
Cisco *§	70	29	48.0		17.0
Claremont †	91	42	64.5	5.02	
Corning *§	90	45	64.7	0.75	
Coronado	85	57	68.6	0.97	
Craftonville	100	46	67.5	1.66	
Crescent City †	69	37	51.8	3.62	
Crescent City L. H.				1.79	
Davisville *b	96	45	67.8	1.15	
Delano *§	90	47	68.1	0.73	
Delta *§	91	42	63.0	3.50	
Descanso *§	87	32	58.7	2.71	
Drytown	89	34	60.8	1.06	
Dunnigan *§	98	42	69.8	1.30	
Durham *†	86	37	60.0	0.45	
East Brother L. H.				1.95	
Edgwood *§	76	34	52.4	0.40	
Edmanton *†	81	30	52.1	2.53	8.0
Escondido	92	37	63.8		
Fallbrook *†	90	50	62.3	2.68	
Famosa †	91	52	69.4		
Folsom City *b †	92	45	64.4	0.90	
Fordyce Dam †				2.46	22.0
Fort Bragg †				1.39	
Fort Ross				3.79	
Fort Tejon				1.63	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
California—Cont'd.	°	°	°	*Ins.*	*Ins.*
Georgetown †	84	38	61.6	1.76	
Glendora				2.62	
Goshen *§	93	42	61.1	0.68	
Grass Valley				1.72	
Greenville †	85	25	52.3	0.95	
Guinda				1.54	
Healdsburg *†	88	40	59.4	1.58	
Hollister	91	32	57.0	1.55	
Hueneme				0.49	
Humboldt L. H.				2.52	
Hydesville †				1.35	
Indio *§	96	49	71.1	0.00	
Iowa Hill *†	85	41	60.7	0.49	
Isabella	95	36	62.6	1.17	
Jackson	80	37	60.1	1.35	
Jolon				0.75	
Keeler *§	90	48	71.6	T.	
Keene *§	88	40	58.7	1.72	
Kennedy Gold Mine	89	38	63.0	1.17	
Kernville				1.48	
King City *§	96	42	59.5	0.56	
Kingsburg *§	90	45	66.5	2.65	
Kono Tayee	83	45	63.1	0.73	
Lagrange *§	96	48	68.3	1.50	
Laporte *†	76	29	48.1	3.09	23.0
Lemoore *§	93	40	65.5	0.77	
Lick Observatory †	82	33	57.8	1.85	
Lime Kiln	101	42	69.8		
Lime Point L. H.				1.83	
Lodi	91	42	63.6	1.19	
Los Alamos †				1.50	
Los Gatos *b*	88	43	61.4	1.95	
Malakoff Mine *†	81	38	58.6	2.33	
Mammoth Tank *§	104	52	78.6	T.	
Manzana	94	34	61.0	0.61	
Mare Island L. H.				1.61	
Merced *§	95	44	67.1	0.91	
Middletown *†	93	37	59.6	1.10	
Mills College				1.51	
Milton (near) *†	96	50	69.2	1.45	
Modesto *§	98	45	67.3	1.08	
Mohave *§	96	41	65.6	0.70	
Mokelumne Hill *§		42	62.1	1.42	
Monterey *§	76	44	56.6	0.65	
Morena Dam *†	89	35	57.7	1.51	
Mount Glenwood *†	92	51	69.4	1.78	
Mutah Flat †				1.75	
Napa *b*	94	39	61.8	1.20	
Nevada City †	79	34	56.7	2.18	
Newcastle *a †	87	42	64.1	1.07	
Newhall *§	101	40	60.9	1.55	
Nordhoff †	96	33	61.0	1.38	
North San Juan *†	88	34	59.7	1.54	
Oakland *a*	81	45	58.2	1.72	
Oleta *†	87	42	57.9	1.06	
Orangevale †	90	49	67.4	0.75	
Orland *§	91	40	67.4	1.02	
Palermo †	92	38	64.2	0.54	
Paso Robles *b* *†	96	40	63.4	1.66	
Peachland *†	86	39	58.1	2.59	
Picachot	102	55	79.4	T.	
Piedras Blancas L. H.				1.40	
Pigeon Point L. H.				0.54	
Pilot Creek				1.95	3.0
Placerville	83	32	57.0	1.51	
Point Ano Nuevo L. H.				0.78	
Point Arena L. H.				1.40	
Point Bonita L. H.				2.16	
Point Conception L. H.				0.68	
Point Fermin L. H.				0.70	
Point Hueneme L. H.				1.20	
Point Lobos	75	48	55.8	1.58	
Point Loma L. H.				0.59	
Point Montara L. H.				1.40	
Point Pinos L. H.				0.88	
Point Reyes L. H.				1.76	
Point Sur L. H.				0.82	
Pomona (near)	94	42	66.4	1.45	
Poway *§	89	45	58.5	1.51	
Quincy †	77	28	51.3	1.05	
Ravenna *§	93	41	64.7	1.76	
* Redding *b* †	92	43	66.8	1.99	
Reedley (near) *†	94	47	67.7	0.98	
Represa	86	40	62.9	0.82	
Riovista	91	45	66.6	1.44	
Roe Island L. H.				1.35	
Sacramento *a*	86	39	62.4	0.94	
Salinas *§	80	45	56.3	1.20	
Salton *§	111	63	85.3	0.93	
San Bernardino †	96	41	65.4	2.10	
San Jose *b*	84	38	57.4	1.32	
San Leandro *†	88	50	62.4	1.41	
San Luis L. H.				1.45	
San Mateo *§	82	48	60.8	1.31	
San Miguel *§	93	41	62.1	0.67	
San Miguel Island †	75	52	60.0	0.60	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
California—Cont'd.	°	°	°	*Ins.*	*Ins.*
Santa Ana*§	88	50	65.1	1.38	
Santa Barbara *a*	82	48	63.3	0.92	
Santa Barbara L. H	.....	.....	.....	0.74	
Santa Clara *a*§	84	44	58.7	1.47	
Santa Cruz *b*†	94	38	58.3	1.88	
Santa Cruz L. H	.....	.....	.....	2.00	
Santa Maria	85	40	61.6	0.60	
Santa Monica*§	79	52	66.7	0.73	
Santa Paula *b*†	93	43	59.8	0.97	
Santa Rosa*§	86	45	58.4	1.50	
Saticoy	.....	.....	.....	0.97	
Shasta	.....	.....	.....	3.92	
Sneddens Ranch†	.....	.....	.....	1.10	
S. E. Farallone L. H	.....	.....	.....	1.44	
Stanford University	87	41	59.8	0.20	
Stockton *a*	88	41	63.0	1.11	
Summerdale†	78	28	54.1	2.53	6.0
Susanville†	80	32	58.2	0.50	
Sutter Creek*§	86	35	59.8	0.64	
Tecarte Dam*‖	100	36	55.6	1.41	
Tehama*§	93	48	67.6	0.65	
Templeton*§	88	40	59.6	1.00	
Trinidad L. H	.....	.....	.....	2.20	
Truckee*§	78	30	47.4	0.40	4.0
Tulare *b*	.....	.....	.....	0.92	
Tulare *c*	100	38	66.8	0.74	
Turlock *b*†	98	35	64.1	1.68	
Ukiah†	88	35	58.7	1.14	
Upper Lake	94	37	61.6	1.04	
Upper Mattole	.....	.....	.....	3.93	
Vacaville *a*[1]	96	46	66.4	1.30	
Ventura†	79	39	58.0	0.85	
Volcano Springs*§	112	50	82.1	0.00	
Walnutcreek	91	46	64.8	0.22	
West Palmdale	.....	.....	.....	1.42	
Westpoint†	.....	.....	.....	1.52	
Wheatland†	87	39	62.6	1.18	
Williams*§	93	45	66.3	0.55	
Wilmington*§	77	50	66.3	.....	
Wire Bridge*§	90	40	63.8	1.04	
Yerba Buena L. H	.....	.....	.....	1.30	
Yreka†	82	27	53.2	0.89	
Yuba City*§	88	54	69.7	0.76	
Engineers Quarters‡	.....	.....	.....	2.30	
Morses House‡	.....	.....	.....	3.83	
Deep Creek‡	.....	.....	.....	2.28	
Holcomb Creek‡	.....	.....	.....	1.70	
Squirrel Inn‡	.....	.....	.....	3.20	
Colorado.					
Alma†	60	14	34.3	1.13	.....
Antlers†	80	28	50.6	0.68	
Arkins	.....	.....	.....	0.68	.....
Boxelder	.....	.....	.....	0.02	1.0
Breckenridge†	69	8	34.8	0.82	8.2
Byers*[1]	76	29	46.0	.....	4.0
Canyon†	82	27	51.3	0.55	
Castlerock†	80	17	45.4	1.62	12.0
Colorado Springs†	76	24	47.5	0.36	T.
Cope†	85	24	50.3	1.33	10.5
Cripple Creek†	79	15	46.0	0.90	8.5
Crook‖	89	17	48.7	.....	.....
Deertrail*§	75	25	50.0	.....	7.0
Denver	.....	.....	.....	.....	2.5
Downing†	80	18	53.7	1.25	4.0
Dumont*†§	.....	.....	.....	0.75	.....
Durango†	72	26	48.5	3.61	
First View*§	84	.....	49.3	0.68	4.0
Fleming	.....	.....	.....	1.60	16.0
Fort Collins†	84	21	48.0	0.49	T.
Fox	.....	.....	.....	1.60	12.0
Garnett	.....	.....	.....	T.	
Gleneyrie†	70	24	46.2	0.75	.....
Goldhill*[1]	75	21	47.7	1.30	12.5
Grand Junction†	77	32	54.6	0.79	
Greeley†	81	19	45.8	0.63	2.5
Gulch†	72	21	45.7	0.62	T.
Gunnison†	77	7	40.5	T.	T.
Holly	.....	.....	.....	1.02	4.2
Hugo*§	70	22	43.8	.....	2.5
Hugo (near)	77	21	44.9	0.57	5.0
Husted†	81	20	47.3	0.86	6.0
Kit Carson*[1]	82	26	50.4	.....	10.0
Lake Moraine†	60	10	36.6	2.50	21.0
Lamar†	89	15	53.3	0.87	8.0
Laporte	.....	.....	.....	0.50	
Las Animas†	85	12	49.8	1.43	12.0
Lay†	75	14	44.2	0.25	.....
Leadville (near)*†[1]	68	16	38.1	0.54	1.0
Leroy†	88	21	49.1	0.90	9.0
Longmont†	83	24	48.2	0.59	1.8
Longs Peak	67	15	39.8	1.05	9.5
Loveland	.....	.....	.....	0.52	1.0
Meeker†	75	13	44.3	0.28	.....
Millbrook†	81	8	44.0	1.51	13.0
Minneapolis†	87	27	52.6	0.98	5.0
Montrose†	78	25	50.5	0.68	
Moraine†	70	14	41.4	0.75	8.0
Pagoda†	77	11	43.4	0.11	.....
Paonia†	.....	.....	.....	0.62	
Parachute†	82	28	50.3	0.65	
Pinkbamton*[1]	77	13	43.5	0.52	3.0
Pueblo	.....	.....	.....	.....	T.
Rangely†	77	16	46.0	0.05	
Redcliff	.....	.....	.....	0.55	5.5
Rico†	68	13	41.5	2.20	11.0
River Bend*§	73	33	53.1	.....	8.4
Rockyford†	85	14	50.6	1.60	9.5
Saguache†	72	16	44.4	T.	T.
San Luis†	87	19	46.7	1.54	
Santa Clara*[1]	70	16	38.8	3.80	18.0
Seibert†	.....	.....	.....	1.28	15.0
Sherwood Ranch	74	9	40.2	.....	8.0
Smoky Hill Mine†	78	13	44.8	1.40	9.0
Springfield†	.....	.....	.....	0.76	4.0
Stamford*[1]	66	18	35.0	1.80	18.0
Steamboat Springs†	78	12	43.0	0.25	2.5
Sulphur Springs†	77	9	40.9	0.56	4.0
Surface Creek†	77	22	49.0	0.44	
Thon†	85	20	49.4	1.32	5.5
T. S. Ranch†	78	30	52.2	0.80	
Vilas	.....	.....	.....	0.70	2.0
Twin Lakes	.....	.....	.....	0.48	
Wallet†	.....	.....	.....	1.70	14.0
Watkins*[1]	76	28	49.0	.....	3.5
Wray†	86	19	49.6	1.37	10.0
Yuma	.....	.....	.....	0.78	7.0
Connecticut.					
Bridgeport	75	30	50.8	2.45	
Canton†	75	23	47.5	3.73	
Colchester	76	26	48.7	4.65	
Falls Village	.....	.....	.....	3.10	
Greenfield Hill	.....	.....	.....	2.80	
Hartford *b*	.....	.....	.....	3.65	
Hartford *c*	72	30	48.9	.....	
Lake Konomoc	.....	.....	.....	3.60	
Middletown	78	27	49.5	4.32	
New London†	73	30	49.4	3.37	
North Franklin	.....	.....	.....	3.62	
North Grosvenor Dale	72	21	47.0	2.94	
Norwalk	73	26	48.8	2.22	
Southington*[1]	73	26	47.6	3.30	
South Manchester	.....	.....	.....	4.00	
Storrs	74	25	47.2	3.60	
Voluntown†‖	75	24	49.0	3.05	
Wallingford†	.....	.....	.....	3.40	
Waterbury	75	27	49.2	2.77	
West Cornwall†	68	28	45.8	3.20	
West Simsbury	.....	.....	.....	3.16	
Windsor	72	26	47.7	3.43	T.
Delaware.					
Dover†	74	35	53.1	3.84	
Milford	84	33	55.9	3.65	
Millsboro	76	31	54.0	5.19	
Newark	74	28	51.4	1.92	
Seaford†	76	34	53.4	2.48	
Wilmington†	77	34	54.9	1.87	
District of Columbia.					
Distributing Reservoir*§	76	31	55.2	0.30	
Receiving Reservoir*§	74	33	54.6	0.33	
West Washington	79	29	53.7	0.39	
Florida.					
Amelia†	83	52	69.1	5.51	
Archer†	88	44	71.0	3.28	
Avon Park†	92	53	74.8	1.83	
Brooksville†	86	50	70.8	0.76	
Carrabelle†	88	45	71.4	4.40	
Clermont†	89	53	74.4	1.05	
De Funiak Springs	90	43	67.6	4.05	
Earnestville†	88	52	72.7	1.89	
Emerson†	89	40	69.4	2.67	
Eustis†	89	50	72.7	0.84	
Federal Point†	85	49	69.6	8.58	
Fort Meade†	90	48	71.8	2.42	
Frostproof*†[1]	90	56	73.2	1.89	
Grasmere†	87	46	72.0	1.00	
Huntington	87	53	71.7	.....	
Kissimmee†	93	60	77.2	3.78	
Lake Butler†	.....	.....	.....	5.50	
Lake City†	89	47	69.3	4.42	
Lemon City†	90	58	78.1	1.25	
Macclenny†	91	44	70.0	3.35	
Manatee†	89	52	72.2	3.57	
Merritts Island†	86	60	73.1	2.17	
Milton†	.....	.....	.....	5.75	
Mullet Key†	83	64	74.0	1.61	
Myers†	88	59	75.4	4.72	
New Smyrna†	84	49	70.6	4.14	
Oakhill*[1]	88	60	76.3	.....	
Ocala*†[1]	87	47	72.3	1.06	
Orange City	88	47	72.1	1.66	
Orlando†	85	48	70.6	1.07	
Oxford*†[1]	86	54	72.2	0.90	
Plant City†	90	48	72.4	2.31	
St. Francis†	88	41	70.3	1.40	
St. Francis Barracks	82	52	69.0	7.05	
Tallahassee†	82[1]	45[1]	67.4[1]	3.60	
Tarpon Springs†	88	51	72.5	0.88	
Georgia.					
Adairsville†*	79	33	57.6	1.04	
Albany†	85	33	65.2	2.10	
Allentown†	82	42	64.6	0.72	
Americus†	84	41	65.3	1.98	
Athens *b*†	83	32	61.0	1.82	
Blakely*†§	85	44	66.1	1.97	
Brag†	90	35	66.8	0.57	
Canton†	.....	.....	.....	2.27	
Cedartown*[1]	82	31	60.8	1.10	
Clayton†	78	28	55.8	2.87	
Covington	82	30	59.2	2.62	
Dahlonega†	80	31	58.7	3.36	
Diamond†	76	29	54.8	2.29	
Elberton†	85	40	63.2	2.27	
Fleming†	86	37	65.6	1.29	
Gillsville†	85	31	62.8	1.57	
Hephzibah*†§	82	48	66.9	0.50	
Lagrange†	85	37	66.2	1.07	
Louisville†	87	36	64.6	0.64	
Lumpkin†	84	45	66.5	2.82	
Macon†*b*	.....	.....	.....	1.58	
Marietta†	78	34	59.6	1.82	
Marshallville†	79	44	64.9	2.15	
Milledgeville†	82	39	64.4	1.86	
Millen†	89	36	63.3	0.68	
Monticello*†[1]	89	47	65.8	.....	
Morgan†	86	37	65.8	2.33	
Newnan†	80	38	61.8	1.39	
Piscola	84[1]	43[1]	68.2[1]	2.50	
Point Peter*[1]	78	32	58.8	2.35	
Poulan†	88	34	66.2	2.05	
Quitman†	84	41	66.6	1.07	
Ramsey†	80	32	59.8	1.65	
Resaca†	.....	.....	.....	1.78	
Rome†	80	34	60.0	1.45	
Talbotton†	79[1]	39	62.2[1]	2.38	
Thomasville†	86	41	68.3	1.61	
Toccoa†	80	35	59.4	1.56	
Washington†	.....	.....	.....	2.84	
Idaho.					
Blackfoot†	80	18	46.4	0.92	
Boise Barracks†	86	29	51.5	1.16	
Burnside†	76	19	46.2	1.00	.....
Chesterfield†	75	8	39.0	0.65	T.
Cœur d'Alene	77	26	49.6	.....	
Corral*†[1]	75	15	43.4	0.60	1.0
Dairy†	81	10	46.4	0.75	
Downey†	80	15	46.2	0.62	
Fort Sherman†	75	26	48.6	1.70	
Gimlet†	76	16	47.0	0.43	3.5
Kootenai†	74	23	45.6	1.35	
Lake†	78	.....	.....	1.36	10.5
Lewiston *a*†	.....	.....	.....	1.20	
Lost River†	.....	.....	.....	0.14	T.
Martin†	76	10	42.2	0.55	.....
Minidoka†	90	10	48.8	0.00	
Moscow†	76	28	50.3	1.07	
Murray†	70	24	45.8	0.87	
Nampa	88	25	52.0	0.78	
Ola†	78	22	48.2	1.74	
Paris†	81	15	45.8	0.05	
Payette†	96	25	53.0	0.05	
Pollock†	82	28	53.0	0.97	
Rexburg†	80	16	44.2	0.00	
Roseberry†	76	15	43.6	0.12	0.3
Salubria†	84	23	50.8	1.18	T.
Shoup†	76	24	50.4	0.38	
Soldier†	78	9	43.4	0.33	0.5
Swan Valley†	82	10	41.6	0.32	0.5
Warren†	79	15	47.2	1.16	3.0
Yellowjacket†	.....	.....	.....	0.63	.....
Illinois.					
Albion†	80	29	55.4	2.05	
Alexander†	85	24	53.2	1.98	
Ashton*†[1]	75	23	46.1	0.87	
Atlanta	.....	.....	.....	0.23	
Atwood *a*†§	80	22	46.2	1.71	
Atwood *b*	.....	.....	.....	1.46	
Aurora *b*†	76	23	46.8	0.36	
Beardstown†	.....	.....	.....	2.97	0.2
Bloomington†	81	22	51.8	0.16	
Bushnell†	80	25	51.4	1.65	
Cambridge	75	27	48.8	1.46	
Carlinville†	81	26	53.9	1.35	
Carlyle	.....	.....	.....	1.98	
Carrollton	76	30	52.6	1.37	
Charleston	80	23	51.9	0.49	
Chemung*[1]	72	18	44.2	1.06	
Chester†	.....	.....	.....	1.90	
Chicago	.....	.....	.....	.....	T.

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Illinois—Cont'd.	°	°	°	*Ins.*	*Ins.*
Cisne *†	80	26	49.6	2.43	
Clearcreek †	81	20	48.2	0.08	T.
Coatsburg †	80	25	51.8	1.65	
Cobden †	83	28	56.4	2.32	
Cordova †				2.04	
Decatur †	79	27	53.5	0.66	T.
Dixon †	74	23	48.0	0.89	T.
Dwight †	79	20	46.0	0.64	T.
East Peoria †	82			0.34	
Effingham †	79	28	52.4		
Evanston *[20]	76	27	50.0		
Fort Sheridan †	75	26	46.6	0.97	T.
Friendgrove *†		32	52.0	1.48	
Galva †	75	22	48.8	1.30	
Glenwood *†	76[f]	26	45.4[g]	0.65	T.
Golconda †	87[i]	29[i]	52.2[i]	2.79	
Grafton †				1.16	
Greenville †	83	28	54.6	2.80	
Griggsville †				1.60	
Halliday *[b]	81[d]	36[d]	57.1[d]	2.35	
Havana †	79	28	53.8	0.58	T.
Herrin *[i]	80	32	56.6	2.00	
Hillsboro †	78	29	53.7	1.74	
Iron †	82	32	55.2	1.87	
Joliet †	82	25	51.4	0.86	T.
Jordans Grove †	80	31	56.6	1.56	
Kankakee *[b]†	71	29	45.6		
Knoxville *[b]	80	25	50.0	2.06	
Lagrange †	77	24	47.1	0.85	1.0
Laharpe *[i]	74	22	49.6	2.00	
Lanark *[i]	73	17	44.0	1.97	T.
Loami †				1.66	T.
Louisville †	79	27	53.9	2.31	
McLeansboro †	81	28	55.4	1.73	
Martinsville †	79	24	51 4	0.95	
Martinton †	82	24	49.9	0.25	
Mascoutah *[b]	80	32	57.8	1.90	
Mattoon *[i]	78	30	53.2	0.49	
Minonk †	81	22	49.6	0.20	
Monmouth †	77	21	49.8	1.76	
Morrisonville †	84	22	52.8	1.19	
Mount Carmel †				2.04	
Mount Pulaski	82	26	53.0	0.43	T.
Mount Vernon	81	29	56.0	1.86	
New Burnside †	87[c]	30[c]	55.8[c]	1.74	
Olney a *[i]	80	28	55.1	1.69	
Oregon †	74	21	46.4	0.85	
Oswego *[i]	76	22	45.0	0.31	
Ottawa †	80[h]	21[c]	48.4[d]	0.17	
Palestine †	79	25	52.9	2.60	
Peoria a †				0.26	
Peoria b †	80	27	53.0	0.33	
Philo †	81	18	49.6	0.20	T.
Plumhill *†	80[c]	32[c]	54.3[c]	1.72	
Rantoul *†	81	23	51.0	0.22	
Reynolds	74	23	48.9	1.74	
Riley †	73	23	46.1	0.38	T.
Robinson *†	76	24	48.3	0.96	
Rockford †	78	24	51.6	0.85	T.
Rose Hill †				1.25	
Roundgrove †	76	21	48.4	1.00	
St. Charles *†	75	23	45.4	0.40	T.
St. John *†	78	30	55.6	1.94	
Springfield					T.
Streator †	78	27	50.6	0.05	
Sycamore †	73	23	46.8	0.26	T.
Tiskilwa *†	73	26	44.8	0.76	
Tuscola †	80	17	50.0	0.65	T.
Walnut †	76	22	50.0	1.20	
Wheaton *[i]		26	42.8	0.53	1.0
Winnebago †	73	23	46.3	0.75	
Zion †	74	21	48.0	1.50	T.
Indiana.					
Anderson †	77	24	50.8	1.09	T.
Angola *[i]	78	22	48.3	0.75	0.2
Auburn †[s]	78	20	46.4	0.47	
Bedford †	80	24	51.4	T.	
Bloomington †	77	22	51.9	1.35	
Bluffton †	79	30	48.4	1.04	T.
Bright †	75	34	52.9	1.21	
Butlerville †	77	25	51.9	1.72	
Cambridge City †	76	20	49.0	0.69	
Columbia City *[i]	74	24	47.1	0.57	
Columbus †	75	24	50.8	1.09	
Connersville †	75	24	49.4	1.05	T.
Delphi †	81	23	49.8	0.69	
Edwardsville *†	80	34	55.0	1.78	
Evansville †	84	28	54.6	2.71	
Farmland †[c]	74	25	48.9	0.66	T.
Franklin *[i]	80	29	51.4	1.40	T.
Greencastle †	76	30	51.3	1.34	0.2
Hammond †	72	22	45.8	1.11	2.0
Huntington	78	24	48.7	1.19	0.5
Indianapolis					T.
Jasper †	81	27	53.3	1.55	
Jeffersonville	79	30	54.2	1.94	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Indiana—Cont'd.	°	°	°	*Ins.*	*Ins.*
Knightstown †	75	25	50.0	0.94	T.
Kokomo †	78	24	50.3	0.87	T.
Laconia	77	29	53.4	1.65	
Lafayette †	79	22	50.3	0.37	
Logansport *b†	76	23	48.3	0.60	
Madison †	79	30	54.2	1.54	
Marengo †	82	26	53.3	2.06	
Marion †	76	25	50.1	1.25	T.
Mauzy †	76	25	49.2	1.00	T.
Mount Vernon †	86	30	56.1	2.53	
Northfield †	75	23	48.8	1.39	
Princeton *†	82	29	52.2	2.00	
Richmond				0.99	
Rockville †	79	23	51.2	1.07	T.
Seymour †	75	30	52.9	1.57	
South Bend †	79	25	48.8	0.08	0.5
Sunman	74	26	49.7	1.47	
Syracuse †				0.59	0.1
Terre Haute †	78	30	55.0	0.87	
Tipton †	79	23	52.4	0.22	
Topeka †	76	25	48.1	0.89	
Valparaiso †	78	26	48.3	1.17	3.0
Vevay	78	30	54.0	1.37	
Vincennes †	79			1.58	
Warsaw †	80	22	49.8	0.13	
Washington †	75	30	54.8	1.94	
Worthington †	82	24	52.7	1.59	T.
Indian Territory.					
Eufaula †				2.70	
Healdton †	91	36	61.8	1.54	
Lehigh †	96	31	61.7	2.50	
Purcell †	90	44	63.6	1.92	
Tahlequah	94	30	61.0	3.43	
Tulsa †				4.60	
Iowa.					
Adair				2.70	
Afton	77	22	49.8	3.93	T.
Algona *[i]	77	19	45.3	2.92	0.5
Alta a †	74	22	46.5	2.78	0.5
Amana †	74	19	47.4	2.95	
Ames b	74	19	46.8	2.44	T.
Atlantic †	82	16	47.8	4.26	T.
Audubon	75	15	46.2	3.07	
Belknap	83	23	54.2	3.00	
Belleplaine	74	15	44.6	3.35	
Bonaparte †	77	23	50.9	2.26	
Carroll	76	16	46.4	3.19	T.
Cedarfalls †	74	16	47.4	2.94	
Cedar Rapids †	79	19	47.6	2.76	
Centerville †	75	23	51.6	2.90	T.
Chariton	75	26	49.6	3.25	
Charles City †	73	15	45.7	3.23	0.5
Clarinda †	77	26	51.0	3.30	T.
Clinton	77	20	48.2	1.68	
College Springs	82	23	52.7	3.11	
Corning †	79	19	49.1	3.44	
Council Bluffs				4.19	
Cresco †	72	15	44.8	2.36	1.0
Decorah †	72	15	45.6	3.20	
Delaware *[2]	74	21	48.6	2.55	
Denison †	74	20	48.2	2.47	
Des Moines					T.
Dows	77	12[c]	47.6	3.28	0.5
Dubuque					T.
Eldora	83	16	48.8	3.60	
Elkader †	77	12	45.7	2.78	T.
Estherville	77	15	45.0	2.78	T.
Fairfield †	75	21	46.8	2.66	
Fayette †	75	12	45.4	3.45	T.
Forest City	75	18	44.8	3.46	0.1
Fort Madison *†	73	30	52.8	1.51	
Galva †	77	19	46.2	2.04	0.8
Gardengrove	74	20	47.6	2.66	T.
Glenwood †	82	21	49.0	2.83	
Grand Meadow *[i]	68	20	44.4	3.35	1.5
Greenfield †	79	19	49.2	3.41	T.
Grinnell †	70	25	49.6	3.30	
Grundy Center	73	16	47.0	3.13	T.
Guthrie Center	75	18	46.7	2.39	
Hampton	72	20	46.2	4.39	0.8
Hawkeye				3.63	2.0
Hopeville †	76	24	50.0	3.67	
Humboldt †	74	19	47.5	3.08	0.5
Independence †	72	16	45.6	3.51	T.
Indianola †	74	21	51.2	3.09	
Iowa City a †	75	20	48.6	2.74	
Iowa City b	74	20	48.9		
Iowa Falls †	75	18	46.1	3.30	T.
Keosauqua †	76	27	51.2	2.56	
Knoxville	73	25	45.3	5.05	
Lansing	76	16	47.4	2.45	T.
Larchwood				3.85	T.
Larrabee †	77	17	45.6	3.40	T.
Leclaire †				2.01	
Lemars	86	20	50.4	3.69	
Lenox *[i]	77	25	50.0	3.89	T.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Iowa—Cont'd.	°	°	°	*Ins.*	*Ins.*
Logan †	76	20	48.3	2.81	T.
Madrid	87	20	51.0		
Malvern *[i]	88	14	48.4	4.33	
Marshall †	75	18	48.4	3.59	T.
Mason City †	71	12	43.4	4.22	T.
Mechanicsville	72	20	47.2	2.13	
Millman				3.42	
Monticello *†	73	20	45.3	1.98	T.
Mooar	77	24	48.9	1.80	
Mountayr †	82	23	50.6	3.63	
Mount Pleasant *[i]	74	30	51.4	2.81	
Mount Vernon *[i]	72	23	45.0	2.66	
Neola	82	20	48.0	2.90	
Newton †	72	20	48.6	3.47	T.
North McGregor †				2.13	
Northwood	75	17	46.2	2.56	
Ogden	80	18	48.2	2.95	T.
Osage *†		16	40.8	3.76	0.5
Osceola	80	23	49.9	4.52	T.
Oskaloosa †	77	21	50.8	3.90	
Ottumwa	76	24	51.0	3.80	T.
Ovid †	79	23	51.6	3.87	
Panama †	78	22	49.1	3.17	T.
Plover				2.72	0.2
Primghar	77	20	46.1	3.62	0.2
Reinbeck				2.80	
Rock Rapids	78	14	41.2	3.61	T.
Sac City †	75	20	47.0	4.50	T.
St. Charles	75	24	49.6	2.74	
Seymour †	78	25	52.4	4.32	
Sibley	76	16	43.5	3.35	0.5
Sidney	81	28	50.8	4.38	
Sigourney	75	22	49.4	2.34	
Sioux City					T.
Spencer	74	12	44.5	3.40	0.8
Spirit Lake †	78	16	44.4	3.63	
Toledo	76	18	46.9	3.25	
Villisca †	81	17	48.4	4.16	
Vinton *[i]	73	19	46.6	3.13	
Washington †	75	20	51.9	2.70	
Waterloo	73	18	48.0	2.86	0.2
Waukee	75	20	46.7	2.91	T.
Waverly	72	16	47.0	2.43	0.7
Webster City	71	21	46.9	3.49	0.5
Westbend *†	76	16	43.4	2.55	1.0
Wilton Junction †	84	18	47.7	2.17	
Winterset †	76	17	49.4	3.89	
Kansas.					
Abilene †	92	26	54.3	2.25	
Achilles *[3]	91[d]	25	43.2	1.75	5.0
Altoona *†	85	35	51.8	3.53	
Anthony				2.31	
Assaria *[b]	88	26	52.1	2.41	
Atchison †	92	27	54.2	3.61	
Augusta	91	32	56.1	2.08	
Beloit †	91	27	52.4	3.28	
Blaine	88	27	53.3	3.30	
Campbell	88	25	52.2	3.55	
Colby †	87	17	49.3	1.62	3.0
Columbus †	84	32	54.4	4.31	
Coolidge †	86	22	52.0	1.35	6.0
Cunningham †	92	25	54.6	2.12	
Dodge City					T.
Downs				3.11	T.
Effingham	91	28	56.7		
Elgin *[i]	90	36	55.2	3.92	
Ellinwood †	91	30	53.4	2.11	
Emporia †	82	34	54.6	3.55	
Englewood †	93	24	54.5	1.87	T.
Eureka †				4.12	
Eureka Ranch †	89	22	51.1	2.05	0.2
Fort Riley †	90	30	56.3	1.45	
Fort Scott †[r]	83	34	55.2	1.79	
Frankfort	94	26	57.4	3.90	
Garfield				2.46	T.
Gibson *[5]	88	20	49.2	3.18	T.
Gove *†	89	30	52.0	2.00	5.0
Grainfield *[3]	88	30	54.4	2.10	2.0
Grenola *[1]	86	33	54.2	4.45	
Halstead	84	30	53.2	5.62	
Horton †	84	29	53.7	2.89	
Hutchinson †	95	33	56.6	4.45	
Independence †	89	35	57.7	4.35	
Lakin †	93	24	57.2	0.60	
Lawrence	84	33	55.5	2.76	
Lebo †	87	33	54.6	4.45	
Macksville †	87	28	53.3	2.04	T.
McPherson †	88	28	54.0	3.99	
Manhattan b	92	28	55.3	5.13	
Manhattan c	85	24	55.0	4.90	
Marion †	91	30	57.1	3.70	
Meade †				3.63	T.
Medicine Lodge †	91	26	55.4	2.35	
Minneapolis †	91	26	53.5	2.98	
Morantown †	85	34	55.4	2.71	
Morton †	86	29	54.2	0.75	T.

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Kansas—Cont'd.	°	°	°	*Ins.*	*Ins.*
Mounthope *1	87	36	55.3	4.61	
Ness City †	88[1]	23[1]	54.1[1]	2.15	
New England Ranch [1]	84	20	51.0	2.00	0.8
Norwich †	92	32	57.0	2.40	
Oberlin †	.....	.....	.....	1.75	7.0
Olathe †	88	26	55.9	2.98	
Osage City †	88	25	54.0	3.12	
Oswego †	92	35	59.6	4.02	
Ottawa †	89	26	53.4	2.93	
Paola †	85	28	54.1	3.15	
Phillipsburg †	90	24	52.8	1.64	T.
Pleasant Dale †	92	29	53.8	4.48	T.
Powhattan	83	28	53.2	2.49	
Rome *†	88	35	56.3	3.53	
Russell †	92	26[f]	52.6[e]	4.10	T.
Salina †	90	26	53.8	3.01	
Scott City † *	89	19	52.8	1.43	
Sedan †	92	34	57.4	3.67	
Sharon Springs *[1]	96	26	53.4	1.00	6.0
Ulysses †	88[e]	22[e]	52.6[e]	0.68	T.
Wakefield * [1]	92	32	55.5	2.93	
Wallace *[1]	88	24	52.7	0.93	2.0
Wamego *[1]	90	26	53.9	4.38	
Wellington *[1]	84	36	59.2	3.18	
White Rock	.....	.....	.....	3.89	
Winfield *[5]	88	30	55.4	3.05	
Winona *[1]	94	30	51.4	1.10	1.5
Kentucky.					
Alpha †	89	30	59.7	0.37	
Ashland *[1]	90	32	51.8	.....	
Bardstown †	77	31	53.7	0.54	
Blandville †	81	27	56.5	2.71	
Bowling Green *a* *[1]	78	26	52.3	1.27	
Bowling Green *b* †	79	33	58.0	1.32	
Burnside †	.....	.....	.....	0.98	
Caddo †	77	29	53.8	2.61	T.
Canton *† [1]	83	30	56.7	2.72	
Carrollton †	80	28	55.6	1.65	
Catlettsburg *† [1]	80	37	55.7	2.95	
Earlington	80	32	57.2	2.53	
Edmonton †	75	30	55.6	0.74	
Eubank †	81	25	56.1	0.71	
Falmouth †	.....	.....	.....	2.28	
Fords Ferry †	82	30	57.2	3.50	
Frankfort †	77	31	53.3	1.10	
Franklin *† [1]	80	39	58.4	0.71	
Georgetown	78	28	53.8	.....	
Greendale *[1]	80	33	52.5	1.28	
Greensburg †	80	32	56.0	0.99	
Henderson †	82	35	58.7	2.67	
Hopkinsville †	81	30	57.6	1.76	
Leitchfield †	80	25	53.6	1.41	
Louisa † *a*	81	30	52.1	2.93	
Lyndon	78	31	52.4	1.36	
Marrowbone †	79	28	55.0	0.70	
Maysville †	78	34	53.9	.....	
Middlesboro †	79	26	53.8	1.81	
Mount Sterling †	85	25	51.8	1.91	
Owensboro †	80	30	54.2	2.14	
Owenton †	75[d]	31[d]	53.2[d]	1.82	
Paducah *a* †	.....	.....	.....	2.34	
Paducah *b* †	86	31	59.8	2.34	
Pilot Oak †	84	32	57.9	1.45	
Pleasure Ridge Park †	82	26	53.6	1.96	
Princeton †	84	28	56.6	2.86	
Richmond †	80	29	54.9	1.12	
Russellville †	86	29	59.2	1.38	
St. John †	79	26	54.0	1.48	
Sandyhook †	.....	.....	.....	2.70	
Shelbyville †	81	25	54.4	2.01	
Southfork †	.....	.....	.....	1.59	
Vanceburg †	79	29	53.1	2.40	
Williamsburg †	80	30	57.4	0.93	
Louisiana.					
Abbeville	92	44	69.5	3.95	
Alexandria †	87	38	64.6	4.60	
Amite †	95	30	67.4	4.30	
Bastrop †	95	38	66.1	3.30	
Baton Rouge †	91	45	68.8	7.05	
Calhoun †	89	37[e]	64.2	5.16	
Cameron †	94	50	70.8	1.16	
Cheneyville †	90	36	65.5	3.85	
Clinton †	88	39	65.9	6.48	
Covington †	95	34	68.4	4.17	
Davis *	88	38	63.6	5.12	
Donaldsonville †	93	47	69.7	6.25	
Elm Hall	92	42	65.4	.....	
Emilie †	92	44	67.8	5.37	
Farmerville *	87	39	63.4	6.76	
Franklin †	90	45	68.4	2.73	
Grand Coteau	90	47	67.8	8.66	
Hammond † [e]	90	39	67.4	2.36	
Houma †.	93	42	68.8	4.76	
Lafayette †	95	41	67.8	6.82	
Lake Charles †	88	47	70.9	3.75	
Lawrence †	85	57	70.2	2.55	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Louisiana—Cont'd.	°	°	°	*Ins.*	*Ins.*
Liberty Hill	92	38	65.4	8.90	
Mansfield †	90	38	63.4	6.31	
Maurepas *	97	40	67.6	5.19	
Melville †	87	38	68.2	8.30	
Minden †	92	35	65.0	8.13	
Monroe †	85	44	65.2	4.95	
New Iberia	90[d]	45[d]	68.6[d]	3.95	
Oakridge †	92	35	64.0	4.67	
Oberlin	90	41	66.5	8.65	
Opelousas †	92	40	67.0	6.81	
Oxford †	87	38	63.6	6.43	
Paincourtville †	91	41	67.4	5.96	
Plain Dealing †	86	43	64.4	4.84	
Rayne †	95	40	68.8	4.85	
Robeline †	95	35	63.4	5.84	
Schriever †	94	39	67.6	3.55	
Shellbeach †	91	54	70.8	3.89	
Southern University †	92	45	68.5	4.50	
Sugar Ex. Station †	92	46	69.2	7.48	
Sugartown †	89	42	67.8	1.87	
Thibodeaux	.....	.....	.....	4.55	
Venice †	90	51	70.8	5.60	
Wallace	92	46	69.2	4.89	
West End	.....	.....	.....	5.35	
White Sulphur Springs †	90	41	65.6	5.72	
Maine.					
Bar Harbor	72	25	47.2	5.85	
Belfast *[6]	65	33	45.1	3.25	
Calais †	67	25	47.6	4.09	
Cornish *[1]	68	25	44.0	5.48	
Cumberland Mills	70	25	46.2	3.21	
Fairfield	65	23	45.2	2.00	
Farmington †	68	20	45.8	3.88	
Flagstaff †	66	12	42.0	3.44	.....
Fort Fairfield †	63	20	41.2	3.05	T.
Gardiner	67	26	46.2	2.64	
Kineo †	64	26	42.4	3.61	
Lewiston	68	27	46.6	3.58	
Mayfield	63	21	42.0	4.77	
North Berwick	76	22	46.0	5.09	
North Bridgton	66	27	46.9	3.12	
Orono	68	23	44.7	3.75	
Petit Menan *[1]	57	37	48.1	.....	
Winslow	66	23	45.0	2.06	
Maryland.					
Annapolis	75	44	58.2	.....	
Bachmans Valley	74	27	50.4	2.06	
Boettcherville *[1]	71	24	48.6	1.30	
Charlotte Hall †	85	33	55.5	.....	
Cherryfields † [2]	.....	.....	55.4	1.40	
Chestertown †	71	32	53.5	2.94	
Collegepark	79	26	52.3	0.44	
Cumberland *a*	74	28	50.0	1.32	
Cumberland *b*	78	32	54.4	1.47	
Darlington †	74	31	51.7	3.55	
Deerpark	73[e]	16	44.8[e]	1.37	T.
Easton †	77	29	54.0	1.04	
Fallston *[1]	74	32	51.6	2.99	
Flintstone	74	21	48.2	0.96	
Frederick *a*	74	29	53.0	0.80	
Grantsville	75	22	46.6	2.61	0.2
Greatfalls *[5]	73	33	54.1	0.43	
Greenspring Furnace	73	26	50.6	0.98	
Hagerstown †	74	31	52.0	0.97	
Jewell †	75	33	54.3	0.38	
Johns Hopkins Hospital	77	34	53.7	.....	
Laurel	77	26	52.0	0.55	
Mardela Springs †	80	32	53.4	3.47	
Mount St. Marys Coll. †	79	31	51.8	1.06	
New Market	74	30	52.9	0.86	
Pocomoke City	80	35	58.2	1.84	
Princess Anne	78	25	51.8	2.49	
Sharpsburg	73	28	51.0	0.87	
Solomons †	79	39	57.4	1.39	
Sunnyside	75	19	44.6	3.25	0.8
Taneytown †	78	29	53.0	1.17	
Van Bibber	72	31	51.8	2.42	
Western Port	77	26	48.8	1.11	
Westminster	74	31	52.6	T.	
Woodstock	71	26	50.1	1.00	
Massachusetts.					
Adams	65	25	46.2	.....	
Amherst	70	25	47.8	3.89	
Andover †	70	26	46.5	3.86	
Attleboro	.....	.....	.....	3.11	
Bedford	76	26	47.1	3.15	
Beverly Farms	76	27	47.4	4.28	
Bluehill (summit)	74	20	47.4	4.47	
Bluehill (valley)	75	23	47.1	4.06	
Boston *a*	.....	.....	.....	2.98	
Brockton *a*	77	27	49.2	2.82	
Brockton *b*	.....	.....	.....	2.77	
Brockton *c*	.....	.....	.....	3.75	
Cambridge *a*	76	27	48.4	3.11	
Chestnut Hill	75	26	48.6	3.49	
Clinton *a*	.....	.....	.....	2.82	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Massachusetts—Cont'd.	°	°	°	*Ins.*	*Ins.*
Clinton *b*	75	27	47.8	.....	
Cohasset	.....	.....	.....	3.80	
Concord †	76	23	47.0	3.17	
Dudley [1]	74*	27	46.5	2.70	
East Templeton *[1]	68	30	45.2	2.75	
Egg Rock, Nahant	70	33	48.8	.....	
Fallriver	75	32	50.5	3.31	
Fitchburg *a* *[1]	70	32	45.9	2.92	
Fitchburg *b*	73	26	46.5	2.76	
Framingham	74	25	48.6	3.84	
Groton	73	24	45.7	3.61	
Hadley	72	19	45.6	3.58	
Hingham	.....	.....	.....	3.93	
Hobbs Brook	.....	.....	.....	2.74	
Hyannis *† [1]	73	32	53.0	6.02	
Lake Cochituate	77	20	47.2	3.53	
Lawrence	72	27	47.7	2.65	
Leeds	68	23	46.7	2.97	
Leicester Hill	70	24	44.8	4.03	T.
Leominster	.....	.....	.....	3.27	
Long Plain *[6]	75	26	48.5	3.37	
Lowell *a*	71	27	47.2	3 00	
Lowell *b*	75	25	46.5	.....	
Lowell *c*	79	28	48.6	.....	
Ludlow Center	70	20	43.2	3.68	
Lynn *b*	74	28	48.7	3.33	
Mansfield *[1]	75	22	46.3	2.78	
Middleboro	76	22	47.7	4.38	
Milton	73	24	49.0	3.82	
Monroe	64	20	42.0	3.31	T.
Monson	72	24	47.3	4.01	
Mount Nonotuck	.....	.....	.....	3.41	
Mount Wachusett	.....	.....	.....	3.34	
Mystic Lake	.....	.....	.....	3.37	
Mystic Station	.....	.....	.....	3.11	
Natick *[1]	71	28	47.8	3.61	
New Bedford *a*	73	30	49.6	3.40	
New Bedford *b*	76	27	49.6	3.46	
Newton Center	.....	26	45.6	.....	
North Billerica	73	29	48.7	3.20	
Pittsfield	72	25	45.8	2.74	
Plymouth *[1]	77	36	50.6	3.60	
Princeton	.....	.....	.....	3.49	
Quinapoxet	65	22	42.8	3.95	T.
Roberts Dam	.....	.....	.....	3.18	
Salem	.....	.....	.....	3.29	
Somerset *[1]	76	28	50.9	2.92	
South Clinton	.....	.....	.....	3.93	
Springfield Armory	72	21	45.7	4.03	
Sterling	.....	.....	.....	3.49	
Taunton *b*	75	25	48.0	3.54	
Taunton *c*	75	21	47.2	3.36	
Turners Falls	69	27	46.5	2.98	
Wakefield †	76	26	48.0	3.34	
Webster	.....	.....	.....	2.94	
Westboro †	74	24	48.6	4.14	
Weston	73	25	47.3	2.90	
Williamstown *[1]	67	37	48.4	2.94	
Winchendon	.....	.....	.....	4.30	
Winchester	.....	.....	.....	3.01	
Worcester *a*	70	27	45.9	3.37	
Worcester *b*	70	29	48.2	3.90	
Michigan.					
Adrian	75	20	46.6	0.96	T.
Allegan	76	22	47.6	1.31	
Alma	72	18	45.0	0.67	1.0
Alpena	.....	.....	.....	.....	0.7
Ann Arbor	74	23	46.2	1.51	T.
Arbela	72	20	44.6	0.86	T.
Ball Mountain	70	25	45.0	0.54	T.
Baraga	74	26	42.1	2.81	1.8
Battlecreek	75	26	46.9	1.76	T.
Bay City *b*	74	20	45.0	0.58	T.
Benton Harbor	75	26	48.1	2.18	T.
Berlin *[1]	75	22	45.2	1.49	0.4
Berrien Springs	78	25	46.4	0.65	0.5
Big Rapids	69	18	44.0	1.04	0.5
Birmingham	71	24	45.6	1.86	.....
Bois Blanc *[10]	68	30	45.9	.....	.....
Boon	68	17	42.2	1.13	4.0
Bronson	76	23	47.4	1.28	1.0
Calumet	66	26	41.8	3.37	3.0
Camden	75[e]	25[e]	46.1[e]	1.06	0.2
Charlevoix	68	28	45.4	2.45	4.0
Cheboygan	67	24	42.9	1.18	T.
Clinton	78	21	47.4	1.59	T.
Detroit	.....	.....	.....	.....	T.
Escanaba †	66	22	43.2	3.57	T.
Fairview	72	19	44.6	1.01	
Fitchburg	70	20	43.4	1.53	T.
Flint	73	19	44.5	0.72	0.2
Gaylord	68	21	41.7	1.70	5.5
Gladwin	70	15	43.3	1.95	1.5
Grand Haven	.....	.....	.....	.....	0.4
Grand Rapids *b*	75	22	46.4	1.26	0.2
Grape	75	22	47.4	1.45	T.

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Michigan—Cont'd.	°	°	°	*Ins.*	*Ins.*
Grayling	70	15	41.9	0.60	2.0
Hanover	75	20	46.3	1.13	T.
Harrison	70	23	43.4	1.17	2.5
Harrisville	66	21	43.8	1.47	2.0
Hastings	72	25	46.4	1.16	0.2
Hayes*	74	28	46.7	0.85	.....
Hesperia	72	20	44.8	.....	.....
Highland Station	72	22	45.7	1.36	T.
Holland *[10]	76	32	50.0	.....	.....
Howell [c]	73	20	44.4	1.19	T.
Ionia	75	21	45.9	0.72	.....
Iron River	70*	11*	38.3*	2.48	4.0
Ivan	74	18	44.1	0.76	1.0
Jeddo	71	23	44.4	1.15	.....
Kalamazoo	75	25	47.5	2.47	T.
Lake City	78	17	42.7	1.08	0.5
Lansing	74	21	45.8	0.87	T.
Lathrop	67	14	42.3*	2.56	6.0
Lewiston	70	23	44.8	1.07	T.
Ludington *[10]	72	30	46.3	.....	.....
Luzerne	69	19	42.0	1.22	4.8
Mackinaw City	65	27	42.9	2.31	2.0
Madison	75	24	47.0	1.32	T.
Mancelona	70	17	43.2	1.51	8.0
Manistique	68	21	41.5	4.10	5.0
Marquette	.....	.....	.....	.....	6.3
Mayville [c]	73	23	46.8	0.73	T.
Middle Island *[10]	69	30	44.7	.....	.....
Midland	74	18	45.0	0.87	.....
Mottville *	78	19	47.1	1.14	T.
Mount Clemens	69	22	44.2	1.29	T.
Mount Pleasant *b*	66	18	45.2	0.59	1.0
Muskegon	74	25	45.8	1.01	0.5
Newberry	68	18	40.9	4.57	5.0
North Manitou Island *[10]	65	30	44.8	.....	.....
North Marshall	73	22	45.5	1.69	T.
Northport	69	29	46.7	0.53	4.0
Olivet	73	27	45.4	1.43	T.
Ovid	72	21	45.1	0.74	T.
Owosso	72	19	44.0	0.72	T.
Parkville	.....	.....	.....	0.84	T.
Petoskey	66	26	43.2	2.85	11.0
Plymouth	74	21	47.0	1.53	T.
Pontiac	71	22	45.1	1.61	T.
Port Austin	75	23	44.6	0.63	T.
Port Huron	.....	.....	.....	.....	T.
Powers	71	19	41.0	4.12	4.0
Reed City	69	18	43.3	0.80	2.5
Rogers City *	70	23	43.2	1.49	.....
Romeo	66	25	45.0	1.02	T.
Saginaw	75	24	45.6	0.59	.....
St. Ignace	65	22	43.3	1.99	3.0
St. Johns	74	15	46.0	.....	T.
Sandbeach *a*	88	24	50.1	0.62	.....
Saranac	75	30	45.9	1.01	T.
Sault Ste. Marie	.....	.....	.....	.....	5.9
Somerset	75	21	45.9	1.20	T.
South Haven	74	27	46.4	0.79	0.8
Stanton	72	21	44.8	0.27	1.5
Sturgeon Point *[10]	60	29	44.1	.....	.....
Thornville	74	26	46.2	0.56	.....
Thunder Bay Island *[10]	66	26	44.2	.....	.....
Vandalia	79	28	48.4	1.05	0.5
Waverly	73	19	45.4	0.63	.....
Wetmore	67	13	40.0	4.69	14.0
Ypsilanti	72	22	46.8	1.63	T.
Minnesota.					
Adat	79	9	41.6	1.25	2.0
Albert Lea †	73	18	45.0	2.75	T.
Alexandria †	72[f]	13[f]	41.0[f]	3.01	T.
Beardsley †	80	13	43.5	3.46	0.4
Belleplaine *[1]	77	26	47.8	4.40	.....
Bingham Lake †	71	19	47.2	.....	.....
Bird Island	75	14	44.8	3.57	T.
Blooming Prairie †	72	15	43.8	2.50	1.0
Bonniwell †	76	17	44.0	3.89	.....
Caledonia †	71	16	45.5	3.05	0.8
Cambridge †	72	12	42.2	3.55	.....
Camden	77[b]	18[b]	42.3[b]	3.33	T.
Collegeville	74	22	44.5	3.11	T.
Crookston †	74	13	40.8	1.02	6.0
Detroit City †	.....	10	.....	2.57	T.
Duluth	.....	.....	.....	.....	T.
Faribault	76[l]	15[l]	46.4[l]	1.85	.....
Farmington †	74	13	42.6	3.25	2.0
Fergus Falls †	73	15	42.1	1.96	0.5
Glencoe †	76	10	42.8	3.64	.....
Glenwood †	74	13	41.6	3.74	T.
Grand Meadow †	73	16	44.2	1.97	0.3
Grand Portage	53	15	35.2	0.94	2.0
Granite Falls †	80[b]	14[b]	42.1[b]	3.25	T.
Lakeside †	73	10	41.6	1.80	T.
Lake Winnibigoshish *[1]	74	22	38.6	2.86	0.8
Lambert †	77	10	39.2	.....	.....
Lawrence †	71	12	43.1	5.25	.....
Leech Lake [1]	74*	9	38.6	2.48	0.4
Minnesota—Cont'd.					
Lesueur *[1]	76	12	43.7	2.99	.....
Long Prairie †	72	11	41.0	3.45	T.
Luverne †	75	20	44.5	3.47	1.2
Mapleplain	75	14	43.6	4.08	0.5
Maplewood *[1]	72	21	45.4	.....	0.2
Mazeppa [1]	73*	10	40.6	1.20	.....
Milan †	80	15	43.2	2.66	0.2
Minneapolis *a* †	73	16	44.4	3.94	0.2
Minneapolis *b* [1]	73*	15	42.3	3.86	T.
Minneapolis (W. B.)	.....	.....	.....	.....	T.
Minnesota City *† [1]	76	16	45.9	2.31	T.
Montevideo †	80	14	43.8	2.87	0.2
Moorhead	.....	.....	.....	.....	4.9
Morris	76	12	42.9	3.50	1.0
Mount Iron †	71	8	36.6	4.90	T.
New London	75	10	43.3	1.90	.....
New Richland *[1 d]	74	18	43.3	.....	.....
New Ulm †	75	19	44.7	3.55	T.
Park Rapids †	73	10	39 9	1.76	0.5
Pine River *[1]	72	13	38.2	3.16	0.3
Pleasant Mounds †	78	16	46.2	3.49	T.
Pokegama Falls [1]	75*	5	35.1	3.79	6.1
Redwing †	.....	.....	.....	2.73	.....
Reeds †	.....	.....	.....	3.91	.....
Rolling Green	71	20	44.8	2.50	T.
St. Charles †	74	12	44.6	2.23	0.1
St. Cloud	70	14	40.7	4.30	T.
St. Olaf	75	15	42.2	2.17	T.
St. Paul	.....	.....	.....	.....	0.3
St. Peter	70	18	45.4	1.95	T.
Sandy Lake Dam [1]	72*	8	38.6	5.18	8.0
Sauk Center *[1]	72	12	37.1	3.98	T.
Shakopee [c]	70*	16	45.1	4.15	T.
Tower †	74	8	36.4	1.55	3.5
Two Harbors †	68	19	42.4	4.85	1.0
Wabasha *[1]	75	16	44.2	3.33	.....
Willmar †	75	13	42.5	2.09	T.
Winona	72	20	45.7	2.99	T.
Worthington	73	22	44.4	3.90	0.1
Zumbrota *[1]	72	8	44.2	.....	.....
Mississippi.					
Agricultural College	87	39	64.9	2.61	.....
Austin †	90	33	61.4	2.13	.....
Batesville †	85	31	60.2	2.80	.....
Bay St. Louis	90	54	70.4	4.39	.....
Biloxi †	91	46	69.0	6.80	.....
Booneville †	85	32	64.2	2.24	.....
Briers †	84	43	64.8	7.71	.....
Brookhaven †	91	37	64.9	6.15	.....
Canton †	87	41	65.6	3.02	.....
Columbus *a* †	.....	.....	.....	3.61	.....
Crystal Springs †	87	44	65.6	5.50	.....
Edwards	88	40	66.0	3.90	.....
Enterprise †	86	32	64.2	1.92	.....
Fayette †	90	39	66.2	6.57	.....
French Camps †	89	28	60.2	2.61	.....
Fulton †	84	32	60.6	3.01	.....
Greenville *a*	85	44	63.3	2.89	.....
Greenville *b* †	.....	.....	.....	3.30	.....
Hazlehurst †	92	40	66.4	7.90	.....
Hernando †	85	40	61.0	0.37	.....
Holly Springs †	84	38	60.7	1.97	.....
Itta Bena [1]	83	34	60.8	3.17	.....
Jackson †	86	35	63.4	3.09	.....
Kosciusko †	88	37	63.6	3.19	.....
Lake †	85	38	61.0	4.95	.....
Leakesville †	92	37	68.6	4.40	.....
Logtown †	92	42	67.6	3.18	.....
Louisville †	89	34	64.0	3.12	.....
Macon †	88	38	63.7	1.50	.....
Magnolia †	90	37	66.6	7.27	.....
Mayersville	89	37	63.7	4.60	.....
Meridian †	88	36	64.8	2.62	.....
Natchez †	91	43	67.4	4.70	.....
Okolona †	87	34	61.4	2.65	.....
Palo Alto †	88	41	64.2	2.69	.....
Pontotoc †	89	32	60.9	2.27	.....
Poplarville	.....	.....	.....	3.00	.....
Port Gibson †	91	35	65.0	5.93	.....
Rosedale †	86	32	60.4	3.10	.....
Stonington *[1]	90	44	67.1	.....	.....
Thornton †	90	45	66.3	4.50	.....
Topton *[5]	84	46	67.6	2.15	.....
University †	81	35	62.9	1.51	.....
Water Valley *† [1]	88	34	60.5	3.51	.....
Waynesboro *a*	85	35	63.7	2.90	.....
Waynesboro *b* †	86	42	66.1	2.55	.....
Woodville †	87	47	66.9	7.60	.....
Yazoo City †	91	35	63.8	4.48	.....
Missouri.					
Arthur *† [3]	.....	30	51.2	2.18	.....
Avalon	80	27	53.2	2.54	.....
Bethany	.....	.....	.....	2.05	.....
Birchtree	85	25	54.4	3.29	.....
Bolckow †	.....	.....	.....	2.43	.....
Boonville †	.....	.....	.....	3.82	.....
Missouri—Cont'd.					
Brunswick	79	28	53.5	2.30	.....
Carrollton †	77	33	54.8	2.65	.....
Cedargap *[1]	86	33	54.4	2.25	.....
Conception	79	27	53.4	3.99	.....
Cowgill *[5]	88	30	55.3	1.86	.....
Darksville †	77	29	52.0	2.30	.....
East Lynne *[3]	.....	29	49.8	2.05	.....
Edgehill *[5]	78	28	52.1	2.74	.....
Eightmile *[1]	82	31	53.0	2.12	.....
Eldon *[1]	82	34	56.9	2.81	.....
Elmira	89	19	54.6	1.93	.....
Emma *[3]	.....	32	52.6	1.30	.....
Farmersville	.....	.....	.....	1.79	.....
Fayette	83	28	55.2	2.44	.....
Fulton	.....	.....	.....	2.75	.....
Gallatin *[1]	79	31	52.9	1.91	.....
Gayoso *[3]	.....	32	52.4	1.60	.....
Glasgow	81	27	53.8	3.00	.....
Gordonville *[3]	.....	29	50.0	1.80	.....
Gorin *[3]	76	30	49.5	3.22	.....
Grovedale	85	21	54.0	2.57	.....
Halfway	82	31	55.4	2.69	.....
Harrisonville †	89	29	54.3	2.36	.....
Hastian	82	26	53.6	2.88	.....
Hermann †	.....	.....	.....	3.16	.....
Houston	83	25	55.2	2.03	.....
Houstonia	.....	.....	.....	1.46	.....
Humansville	86	28	55.4	2.13	.....
Irena	.....	.....	.....	4.51	.....
Ironton †	85	22	52.8	2.54	.....
Jefferson City †	82	28	58.1	3.05	.....
Kidder	81	27	52.5	1.96	.....
Lamar †	82	32	54.7	3.32	.....
Lamonte	.....	.....	.....	1.59	.....
Lebanon	83	34	56.5	2.79	.....
Lexington †	79	29	53.8	1.87	.....
Liberty	85	25	54.8	2.34	.....
McCune *† [1]	82	26	52.6	2.20	.....
Macomb	.....	.....	.....	2.10	.....
Marblehill	83	24	54.4	1.90	.....
Marceline	80	22	52.7[f]	3.08	.....
Marshall †	82	25	53.2	2.20	.....
Maryville	80	24	50.4	3.18	.....
Mexico †	82	24	53.3	3.24	.....
Mine La Motte †	80	26	53.8	2.81	.....
Mineralspring	83	31	57.0	4.28	.....
Montreal *[1]	80°	29°	51.6°	2.61	.....
Mount Vernon	87	26	54.0	2.52	.....
Neosho	83	29	56.6	3.63	.....
Nevada	.....	.....	.....	2.12	.....
New Haven *[1]	81	34	57.7	2.96	.....
New Madrid	84	33	58.8	3.19	.....
New Palestine *† [1]	80	35	55.8	2.05	.....
Oakfield	81	30	55.6	2.69	.....
Oakmound	.....	.....	.....	2.77	.....
Oakridge *[4]	.....	31	53.7	2.29	.....
Olden †	84	28	56.0	3.28	.....
Oregon *a*	83	30	54.6	2.92	.....
Oregon *b* *[1]	82	29	52.3	2.97	.....
Osceola †	.....	.....	.....	1.82	.....
Oto	.....	.....	.....	2.10	.....
Palmyra *[5]	82	28	53.4	2.38	.....
Phillipsburg *† [1]	80	31	52.2	3.42	.....
Pickering *[3]	90	23	53.9	3.21	.....
Platte River *[6]	78	22	51.8	2.63	.....
Poplar Bluff	83	28	58.2	1.62	.....
Potosi	80	21	50.0	2.47	.....
Princeton *[1]	80	28	51.8	2.89	.....
Rhineland	79	29	55.0	3.03	.....
Rolla	.....	.....	.....	2.57	.....
St. Charles	83	30	56.1	1.71	.....
St. Joseph †	.....	.....	.....	2.60	.....
St. Louis	80	27	53.3	1.52	.....
Sarcoxie *[3]	81	35	51.5	2.52	.....
Shelbina	.....	.....	.....	3.00	.....
Sikeston	83	30	58.6	1.20	.....
Stellada †	88	27	55.0	1.50	.....
Sublett	.....	.....	.....	3.45	.....
Unionville †	80	25	52.1	2.96	.....
Virgil City	.....	.....	.....	1.73	.....
Warrenton	82	29	54.2	3.81	.....
Wheatland	.....	.....	.....	2.56	.....
Willow Springs	86	26	56.2	2.71	.....
Zeitonia	.....	.....	.....	2.16	.....
Montana.					
Agricultural College	74	27	45.2	0.58	.....
Augusta †	81	24	51.4	0.30	3.0
Bigtimber †	81	20	47.8	0.79	2.0
Billings †	82	14	52.9	0.00	.....
Boulder †	66	24	42.8	0.30	2.3
Bozeman †	76	26	45.6	0.55	.....
Butte †	75	22	44.0	0.47	3.0
Chinook †	82	22	47.9	0.30	.....
Choteau †	81	23	47.0	1.50	3.0
Cokedale † [c]	76	26	46.6	0.56	.....
Fort Custer †	85	17	47.2	4.25	.....

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Montana—Cont'd.	°	°	°	*Ins.*	*Ins.*
Fort Keogh†	86	16	45.4	0.50	
Fort Logan†	75	19	43.4	0.44	2.7
Fort Missoula	76	21	44.4	1.13	T.
Glasgow†	75	11	42.6	0.45	0.5
Glendive†	86	15	47.7	0.40	
Greatfalls†	84	27	52.9	0.03	T.
Havre					0.5
Helena					1.8
Hogan†	78	22	46.2	0.30	3.0
Kipp†	74	19	42.6	0.98	2.4
Lewistown†	80	19	44.0	0.38	1.0
Libby†	80	19	47.3	0.42	T.
Livingston†	79	26	49.4	0.83	T.
Manhattan†	72	16	40.4	0.21	T.
Martinsdale†	78	15	45.2	0.01	0.1
Marysville†	73	24	44.8	0.82	6.2
Miles City					T.
Poplar†	84	9	43.2	0.40	T.
Radersburg†	71	22	46.3	0.60	
St. Ignatius Mission†	72	25	45.6	0.21	
St. Pauls†	75[c]	25[c]	48.2[c]	0.03	0.1
Utica†	78	21	46.3	0.55	
Virginia City†	75	18	44.7	0.72	4.0
Wibaux†	85	5	41.2	0.65	T.
Yale†				0.58	T.
Nebraska.					
Agee[*1]	87	24	44.6	2.27	4.0
Albion†	82	19	48.0	2.66	T.
Alliance[*1]	80	18	43.7	0.70	7.0
Ansley†	90	15	47.1	1.75	
Arapaho				0.80	1.0
Arborville[*1]	90	24	51.6	2.68	T.
Arcadia	88	18	48.5	2.30	3.0
Ashland *a*†	85	24	51.3	3.28	T.
Ashland *b*[*1]	88	26	50.6	3.12	T.
Ashton	80	15	48.4	1.41	1.5
Auburn[*†1]	91	20	53.6	4.22	
Aurora[*1]	86	24	50.2	2.82	T.
Bassett	85	14	46.9	1.32	8.0
Beatrice†	89	23	50.7	2.68	
Beaver City†	84	18	52.0	0.87	1.5
Benkelman[*1]	90	20	51.5	0.80	8.0
Blair				3.08	
Bluehill[*1]	88	30	51.0	2.65	
Bratton				4.32	
Brokenbow[*1]	85	15	49.2	2.35	3.0
Burchard				1.90	
Burwell[*1]	82	26	44.8	1.29	4.0
Callaway†	80	20	51.2	1.00	6.0
Central City[*5]	79	31	48.8	2.40	
Chester[*1]	86	28	49.5	3.07	T.
Columbus†	84	19	48.8	2.25	0.5
Cornlea				1.85	
Creighton†	85	16	44.8	3.23	2.0
Crete	88	25	51.4	3.89	
Culbertson				1.80	10.0
Curtis *a*†	90	23	53.8	3.00	16.0
David City[*†1]	80	28	48.2	3.30	0.5
Divide				1.37	
Dunning				1.30	8.0
Edgar[*1]	88	25	50.9	2.92	T.
Elba				2.47	
Ericson[*†1]	88	19	44.6	1.90	2.0
Ewing†				2.70	2.0
Fairbury†	78	26	51.5	2.82	
Fairmont†	89	20	48.4	3.15	0.2
Filley				2.85	
Fort Robinson	84	20	47.4	1.20	5.0
Franklin†	90	21	48.3	1.23	0.5
Fremont†	80	17	48.1	2.68	
Geneva†	88	21	49.8	3.32	0.5
Genoa†	87	23	49.4	2.03	0.5
Gering†	85	16	46.9	0.33	3.0
Gibbon				1.20	
Gothenburg	88	18	48.1	1.85	5.0
Grand Island *a*				2.50	
Greeley				1.60	0.5
Haigler				0.60	6.0
Hartington†	85	18	46.3	3.23	1.0
Harvard[*1]	86	22	48.1	2.94	T.
Hastings[*1]	87	24	48.5	2.70	T.
Hayes Center†				1.45	8.0
Hay Springs†				0.80	7.0
Hebron†	90	18	50.2	3.31	
Hickman				2.72	
Holdrege *a*				0.70	
Holdrege *b*[*1]	88	26	50.8		2.0
Imperial *a*†	86	13	47.0	1.00	10.0
Indianola (near)				1.40	7.0
Kearney	90	28	50.5	1.25	
Kennedy†	85	12	44.9	1.45	12.0
Kimball†	82	20	47.7	0.20	2.0
Kirkwood[*1]	83	21	44.2	1.49	4.0
Lexington†	84	14	49.3	1.60	3.0
Lincoln *b*†	80	27	50.4	3.30	
Lodgepole†	86	13	46.9	0.60	6.0

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Nebraska—Cont'd.	°	°	°	*Ins.*	*Ins.*
Loup *a*[*1]	88	24	48.4	0.88	1.0
Loup *b*[*1]	86	22	46.9	1.82	2.0
Lynch[*†1]	84	14	43.9	1.93	1.0
Lyons	68	21[d]	45.8	2.55	T.
McCook[*1]	78	26	54.1	0.83	3.0
McCool				2.73	
Madison[*1]	86	17	44.4	2.55	T.
Madrid[*†5]	80	24	45.4	0.80	8.0
Marquette				2.76	0.5
Milford[*1]	75	35	45.8	2.96	
Minden *a*[*1]	86	22	48.1	1.87	2.0
Minden *b*				1.87	
Nebraska City *a*†	83	25	50.2	4.56	
Nebraska City *b*[*1]	82	17	50.4	4.94	
Nemaha[*1]	88	26	51.4	4.20	
Nesbit†	86	15	46.1	1.89	12.0
Norfolk†	83	22	47.9	2.50	0.6
Norman	94	22	53.8	2.17	T.
North Loup†	87	16	47.7	2.18	
North Platte					13.0
Oakdale†	88	16	45.8	2.39	1.5
Odell[*5]	84	22	51.3	2.84	
Omaha					T.
O'Neill†	85	18	46.1	1.84	3.0
Ord	88	15	47.9	2.91	2.0
Osceola				2.53	T.
Ough†				0.60	6.0
Palmer *a*[*1]	90	20	48.9	2.50	
Palmer *b*				1.67	T.
Plattsmouth *a*†				3.56	
Ravenna *a*	90	16	49.4	1.45	2.0
Ravenna *b*[*1]	86	20	44.5	1.40	
Redcloud *a*				2.39	
Redcloud *b*[*1]	90	24	51.0	2.50	
Republican[*1]	76	22	47.4	1.04	2.0
Rulo[*1]	84	28	54.4	2.35	
St. Libory	90	20	50.0	2.33	1.0
St. Paul	84	23	51.3	2.37	2.0
Salem				2.90	
Santee Agency†	89	19	47.6	3.31	2.5
Sargent				2.20	5.0
Schuyler				2.15	
Seneca[*1]	86	20	48.8	0.20	2.0
Seward[*5]	84	22	48.6	3.49	
Springview	84	16	46.8	1.12	3.5
Stanton[*1]	85	22	46.4	2.21	
State Farm	89	21	49.8	3.06	
Strang[*1]	88	26	51.1	3.90	
Stratton				1.25	
Stromsburg				1.87	
Superior[*5]	90	22	50.6	3.98	
Sutton	89[c]	23[c]	49.5[c]	3.47	0.3
Syracuse				3.54	
Tecumseh *b*†	90	18	54.6	3.47	
Tekamah	83	17	47.8	2.95	
Thedford[*1]	88	16	45.9	1.15	5.5
Turlington†	83	23	49.8	3.62	
Valentine†	86	16	45.8	0.35	
Wakefield				3.02	0.7
Wallace[*1]	74	22	45.3	0.70	7.0
Weeping Water[*1]	81	18	46.4	3.01	T.
Whitman				0.70	7.0
Wilber[*1]	85	28	51.8	4.00	
Wilsonville[*1]	80	18	50.1	1.19	2.5
Woodlawn				3.12	
York[*1]	83	24	50.4	2.46	
Nevada.					
Austin	75	27	49.1	0.00	
Battle Mountain[*1]	83	35	50.6	0.18	
Belmont	80	20	51.7	0.16	0.1
Beowawe[*5]	83	28	49.1	0.20	T.
Candelaria	89	29	59.2	T.	
Carlin[*1]	77	20	42.8	T.	
Carson City	83	22	51.0	0.30	0.3
Carson City (W. B.)					0.8
Cloverdale[*1]	83	32	55.3	T.	0.8
Clover Valley				0.63	1.0
Cranes Ranch				0.51	
Darrough Ranch				0.25	
Downeyville	92	32	59.4	0.28	
Duckwater	80[c]	20[c]	54.6[c]	T.	
Elko[*5]	80	28	44.7	0.35	
Ely	73	18	44.2	0.70	
Fenelon[*1]	84	25	44.1	0.40	2.0
Golconda[*1]	78	29	52.9	0.30	T.
Halleck[*1]	77	20	40.2	0.32	1.0
Hawthorne *a*[*5]	81	40	58.0	0.20	
Hawthorne *b*	88	30	55.4	0.20	
Hot Springs[*1]	76	24	58.0	T.	
Humboldt[*1]	75	30	52.0	0.30	
Keysers Springs				0.10	
Knickerbocker Mills	78	29	53.6	0.22	2.5
Lewers Ranch	81	26	52.9	0.68	1.0
Los Vegas	87	36	59.2	0.26	
Lovelock[*1]	92	38	60.4	0.11	
Mill City[*1]	88	30	52.2	0.30	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Nevada—Cont'd.	°	°	°	*Ins.*	*Ins.*
Osceola	84	23	56.0	0.37	
Palisade[*1]	77	25	56.3	0.05	0.5
Palmetto	82	18	50.8	0.30	3.0
Reese River				T	T.
Reno[*5]	85	30	51.8		
Reno State University	82	25	52.4	0.08	
Ruby Valley				1.02	7.0
St. Clair	81	29	52.0	0.24	
San Antonio		20		T.	
Sodaville	88	29	56.6	T.	
Stofiel	82	11	42.1	0.00	
Sunnyside	94	12	54.8	0.17	
Tecoma[*1]	74	30	46.0	0.00	
Toano[*1]	78	30	47.0	0.45	3.0
Tuscarora	72	26	47.4	0.42	2.2
Tybo	76	23	49.8	0.00	
Verdi[*1]	80	31	51.0	0.18	
Wadsworth[*1]	86	26	47.0	0.10	
Wells	76	15	44.4	0.62	1.0
Winnemucca					T.
New Hampshire.					
Alstead[*6]	66	22	44.4	3.35	T.
Bethlehem	66	22	43.4	3.37	T.
Brookline[*1]	74	24	46.8	3.60	
Concord	72	24	46.0	4.00	
Durham	70	22	46.4	3.50	
Grafton†	71	19	43.8	5.67	T.
Hanover	65	24	44.8	3.92	1.0
Keene	71	20	45.2	3.24	
Lancaster	62	20	43.0	3.38	T.
Nashua	74	23	46.5	2.85	
Newton†	74	22	45.6	3.28	
North Conway	74	22	44.8	4.18	0.5
Peterboro	70	20	43.8	4.24	
Plymouth	69	20	43.6	5.09	T.
Sanbornton†	69	22	43.8	5.37	T.
Stratford	69	21	45.1	3.39	T.
Warner				4.78	T.
West Milan	67	16	41.8	2.62	T.
New Jersey.					
Allaire	75	28	54.0		
Asbury Park	69	29	52.0	1.67	
Barnegat[d]	82	28	54.0	1.43	
Bayonne	75	30	53.0	1.88	
Belvidere	74	24	50.2	3.04	
Beverly†	79	28	53.0	2.45	
Billingsport[*1]	76	34	51.9	2.40	
Blairstown	70	25	47.8	2.12	
Boonton	72	25	49.6	1.99	
Bridgeton	75	35	54.8	2.28	
Camden	73	30	52.3	2.67	
Cape May	78	36	54.6	4.58	
Cape May C. H.†	75	33	54.2	3.52	
Charlotteburg	72	21	47.8	2.24	
Chester	68	30	48.0	2.78	
College Farm†	73	28	51.8	1.62	
Deckertown	79	25	49.0	3.07	
Dover	72	21	48.5	2.03	
Egg Harbor City	76	26	51.9	2.83	
Elizabeth†	72	28	51.6	1.81	
Englewood	76	26	49.8	2.15	
Franklin Furnace	69	25	49.2	2.45	
Freehold	78	31	51.6	1.99	
Friesburg				2.13	
Gillette	73	24	48.5	1.95	
Hammonton				2.53	
Hanover	71	29	50.2	1.92	
Hightstown	75	29	52.0	2.18	
Imlaystown	74	30	53.3	1.82	
Junction				1.39	
Lambertville	72	27	50.6	2.23	
Moorestown	78	29	52.9	2.54	
Newark *a*	72	32	52.7	1.62	
Newark *b*†	75	31	52.0	1.76	
New Brunswick *a*	79	28	53.3	1.66	
New Brunswick *b*	77	28	50.5	1.70	
Newton	66	28	48.4		
Ocean City	75	35	53.9	3.05	
Oceanic	73[1]	38[1]	55.2[1]	1.50	
Paterson	80	30	52.5	1.81	
Perth Amboy	72	29	51.2	1.96	
Plainfield	78	28	52.8	2.16	
Rancocas				2.05	
Readington[*6]	76	34	54.7		
Rivervale	76	23	50.0	2.12	
Sergeantsville[*1]	71	32	50.2	2.12	
Somerville	78	22	51.2	1.56	
South Orange	72	28	50.8	1.50	
Staffordville				3.16	
Toms River	76	27	52.7	2.81	
Trenton	78	34	55.7	1.97	
Vineland	76	28	52.1	2.53	
Woodbine	77	25	50.0	3.38	
New Mexico.					
Albert†	78	33	55.6	3.37	
Albuquerque†	73	32	54.3	2.55	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
New Mexico—Cont'd.	°	°	°	*Ins.*	*Ins.*
Alma†	79	30	54.8	5.97	T.
Aztec†	79	26	51.4	2.55	
Bernalillo†	78	27	50.6	3.71	
Bluewater†	73	19	47.2	2.90	T.
Buckman†	74	16	41.6	1.87	T.
Chama†	84	20	48.3	1.47	0.5
Deming*[2]	87	42	62.2	3.35	
East Lasvegas†	72	27	48.4	4.35	2.2
Engle†	79	32	55.5	4.10	
Espanola†	80	29	51.9	2.42	
Estalina Springs	.....	.....	.....	4.12	1.5
Fort Bayard	74	31	53.1	6.15	
Fort Union	87	30	48.7	.....	
Fort Wingate	86	21	51.6	2.35	1.0
Galisteo†	76	30	51.2	2.32	
Gallinas Spring†	76	32	53.0	2.72	
Gila	82	34	58.6	5.27	
Hillsboro†	76	30	54.4	4.44	
Labelle†	66	11	36.6	2.67	19.5
Las Cruces†	83	29	59.0	2.14	
Lordsburg*[2]	75	40	59.3	6.46	
Los Lunas†	81	30	58.6	3.00	
Lower Penasco†	76	30	51.5	6.01	
Monero†	70	20	43.8	3.82	2.0
Ocate†	71	22	47.4	3.81	9.5
Puerto de Luna†	80	36	57.0	3.40	
Raton†	75	20	47.6	0.09	
Rincon†	82	36	59.5	1.83	
Roswell†	87	32	58.8	5.46	
San Marcial†	81	31	57.0	3.53	
Santa Fe	.....	.....	.....	.....	T.
Shattucks Ranch	78	30	51.8	7.64	
Socorro†	.....	32	.....	4.89	
Springer†	81	18	49.4	3.82	4.5
Valley Ranch	76	28	49.0	2.71	T.
White Oaks†	72	29	50.4	4.01	T.
Winsors Ranch	.....	.....	.....	2.65	
New York.					
Adams	.....	.....	.....	1.77	
Addison	75	23	46.0	5.73	T.
Akron	.....	.....	.....	1.80	
Alfred	73	24	48.7	5.02	0.1
Angelica†	71	20	43.0	3.18	T.
Appleton	74	27	45.8	1.15	T.
Arcade	71	23	42.9	3.22	1.0
Atlanta	.....	.....	.....	3.42	
Avon	76	23	45.3	1.48	
Baldwinsville	73	30	47.5	2.07	T.
Bedford	77	26	49.2	2.35	
Big Sandy*[10]	67	30	45.2	.....	
Binghamton†	73	25	46.4	3.68	T.
Binghamton W. B.	.....	.....	.....	.....	T.
Bloomville	73	25	49.4	3.25	
Boyds Corners	.....	.....	.....	2.21	
Brentwood	72	25	50.4	4.10	
Brookfield	70	21	47.8	1.37	1.5
Brooklyn	82	34	52.9	1.73	
Buffalo	.....	.....	.....	.....	T.
Canton†	68	25	42.8	1.02	T.
Carmel	72	24	49.0	2.63	
Catskill	71	29	49.0	2.39	
Charlotte*[10]	64	28	44.4	.....	
Cherry Creek	.....	.....	.....	2.54	
Cooperstown†	68	23	44.3	2.23	T.
Cortland	72	23	44.8	3.32	T.
De Kalb Junction	.....	.....	.....	1.08	
Demster	.....	.....	.....	2.31	
Eagle Mills	.....	.....	.....	2.83	
Easton	.....	.....	.....	3.17	
Elmira†	70	25	47.2	4.86	
Fleming	75	29	46.5	3.10	
Fort Niagara†	75	29	47.6	1.39	
Friendship	75	22	43.6	4.03	T.
Fulton	.....	.....	.....	2.52	
Glens Falls	65	22	45.4	3.65	
Gloversville	63	21	44.8	3.06	T.
Haskinsville	.....	.....	.....	3.80	
Honeymead Brook	69	23	46.6	2.96	
Humphrey†	74	25	44.2	3.00	1.5
Ithaca	74	27	46.7	4.37	T.
Jamestown	74	28	45.8	2.17	1.0
Kings Station	.....	.....	.....	4.25	
Lebanon Springs	67	20	45.2	3.07	
Lockport	74	29	47.2	1.27	0.2
Lowville	67	21	43.4	2.15	1.0
Lyons	73	31	47.4	1.26	T.
Madison Barracks†	67	28	46.3	2.24	
Manhattan Beach†	70	35	51.5	1.64	
Middletown	.....	.....	.....	3.52	
Mohonk Lake	69	31*	47.2*	3.11	
Newark Valley	.....	.....	.....	4.26	
New Lisbon	68	17	42.8	2.09	T.
Niagara Falls	.....	.....	.....	2.03	
North Hammond†	64	26	45.2	1.35	0.8
North Lake	62	20	41.7	2.90	1.8
Number Four†	62	21	41.9	3.44	0.2
New York—Cont'd.					
Ogdensburg	65	27	46.0	0.73	0.5
Oneonta	72	24	47.3	2.26	
Oxford	70	18	43.8	2.69	T.
Palermo†	76	23	46.2	2.02	
Perry City	79	21	43.6	4.07	T.
Phœnix	.....	.....	.....	2.46	
Pine City	.....	.....	.....	5.04	
Pittsford	76	28	46.3	1.19	T.
Plattsburg Barracks†	78	28	43.7	1.68	
Port Jervis	70	24	47.7	3.53	
Potsdam	59	25	41.9	1.14	
Poughkeepsie	75	23	48.2	2.66	
Ridgeway	.....	.....	.....	0.96	
Rochester	.....	.....	.....	.....	T.
Rome	64	25	45.2	1.90	
Romulus	74	29	47.1	3.30	
Saranac Lake	64	22	41.8	1.31	0.5
Setauket†	73	33	52.5	2.87	
Sherwood	.....	.....	.....	3.66	
Skaneateles	.....	.....	.....	3.48	
South Canisteo	76	23	44.6	6.49	T.
Southeast Reservoir	.....	.....	.....	2.39	
South Kortright†	69	18	42.6	2.35	
Tyrone	.....	.....	.....	4.02	
Varysburg	77	23	44.3	2.63	T.
Victor	76	25	44.6	1.61	T.
Wappingers Falls	72	28	50.0	3.34	
Warwick	.....	.....	.....	2.66	
Watertown	69	18	45.6	1.72	
Waverly†	77	21	46.8	4.90	
Wedgwood	75	24	45.1	4.42	T.
Westfield	77	32	47.5	1.40	T.
Westpoint†	76	28	49.2	2.36	
Willetspoint	76	31	51.6	2.43	
North Carolina.					
Asheville†	76	27	54.2	0.87	
Beaufort†	79	44	62.6	3.07	
Biltmore†	77	34	53.4	0.65	
Bryson City†	.....	.....	.....	1.09	
Chapelhill†	79	32	57.7	1.08	
Edenton†	78	37	59.0	2.70	
Experimental Farm	76*	38*	58.2*	.....	
Fairbluff†	.....	.....	.....	1.33	
Falkland*[5]	78	43	61.6	3.30	
Fayetteville†	82	33	60.4	1.36	
Flatrock	73	23	52.6	2.08	
Goldsboro†	84	31	58.8	1.79	
Greensboro†	81	31	58.7	1.20	
Greenville	.....	.....	.....	2.01	
Henderson†	80	34	57.9	1.37	
Highlands	67	25	50.3	4.40	
Horse Cove†	72	31	55.1	3.89	
Jacksonville†	79	35	60.4	2.21	
Lenoir*†[1]	75	30	54.9	1.01	
Linville†	64	24	47.4	1.58	
Littleton†	79	31	56.4	1.49	
Louisburg†	78	31	56.7	1.76	
Lynn*†[2]	78	.....	55.8	2.66	
Marion	79	28	57.8	1.46	
Moncure†	.....	.....	.....	1.60	
Monroe†	78	29	58.3	1.58	
Morganton*†[1]	78	31	54.9	0.76	
Mountairy†	76	24	54.6	0.45	
Mount Pleasant	82	28	58.4	0.95	
Murphy†	.....	.....	.....	2.07	
Newbern†	81	44	62.8	2.17	
Oakridge†	76	32	56.3	1.26	
Pantego	.....	.....	.....	3.26	
Pittsboro†	76	29	56.7	1.28	
Rockingham†	82	34	62.5	1.90	
Roxboro†	76	34	56.3	0.36	
Salem†	79	29	56.4	1.34	
Salisbury†	79	34	56.0	1.00	
Saxon†	79	25	57.5	0.62	
Selma	81	32	58.0	2.25	
Settle	80	28	57.1	1.00	
Skyuka	74	40	56.1	2.43	
Sloan†	81	35	60.3	3.64	
Soapstone Mount†	78	32	54.2	1.47	
Southern Pines†	81	33	60.5	2.10	
Southport†	85	43	63.6	2.72	
Springhope*[1]	78	34	56.7	1.45	
Tarboro	81	29	58.2	2.38	
Waynesville†	78	24	53.0	0.71	
Weldon†	78	32	56.1	1.59	
Willeyton	78	32	56.9	1.81	
North Dakota.					
Amenia	80	9	40.5	0.78	2.5
Ashley†[k]	80	25	45.9	0.90	T.
Bismarck	.....	.....	.....	.....	T.
Bottineau†	72	11	38.8	.....	
Buxton	76	10	40.2	0.91	3.5
Churchs Ferry	76	8	38.4	0.91	4.0
Coalharbor†	76	10	40.4	T.	
Dickinson†	79	5	38.8	0.71	2.0
Ellendale	82	15	42.8	0.92	0.6
North Dakota—Cont'd.					
Falconer	88	5	38.9	0.06	T.
Fargo†	79	18*	41.4*	1.96	
Forman†[j]	81	18	44.8	1.93	4.0
Fort Yates†	79	13	41.8	0.45	T.
Gallatin†	83	8	39.6	1.39	5.0
Grafton†	75	7	38.6	0.23	T.
Grand Rapids†	79	11	41.0	1.96	17.0
Jamestown†	74	18	43.0	1.33	10.5
McKinney	79	6	36.9	0.10	1.0
Mayville	75	14	40.0	1.05	3.5
Medora†	87	5	41.2	0.38	T.
Milton†	74	10	36.6	0.00	
Minto†	78	11	38.6	0.63	
Napoleon†	76	9	39.9	0.62	4.0
New England City†	80	10	39.2	0.00	
Oakdale†[4]	78	14	41.6	0.47	0.3
Portal†	83	7	39.8	0.07	0.7
Power†	83*	11*	46.0*	1.57	2.5
St. John†	73	10	39.4	0.75	0.5
Sheyenne	79	10	39.3	0.38	0.8
Steele†	76*	9*	39.1*	0.11	1.1
Towner†	75	9	38.4	0.00	
University†	78	13	40.9	1.12	3.0
Valley City†[4]	70	9	35.7	0.84	6.0
Wahpeton†	76	15	43.0	0.53	
Wildrice†[2]	.....	.....	37.3	2.73	3.6
Williston	.....	.....	.....	.....	0.5
Willow City†	76	6	40.0	0.00	
Woodbridge†	73	7	36.3	0.70	3.0
Ohio.					
Akron	75	26	47.0	0.81	0.5
Annapolis	70	30	46.8	1.49	
Ashland	72	23	45.8	0.68	T.
Ashtabula	79	29	48.8	1.93	2.0
Atwater	.....	.....	.....	1.24	
Auburn	.....	.....	.....	0.93	T.
Bangorville	72	24	47.8	0.99	T.
Basil	.....	.....	.....	0.85	
Bellefontaine	78	24	51.4	0.60	T.
Bement	.....	.....	.....	0.93	T.
Benton Ridge	79	20	49.2	0.56	T.
Berlin Heights	77	25	47.6	1.60	
Bethany	75	29	54.4	1.11	
Bigprairie	75	22	46.4	1.02	T.
Binola	78	26	49.4	1.16	T.
Bissells	74	25	47.6	1.01	T.
Bladensburg	77	30	47.1	0.69	T.
Bloomingburg	77	27	49.7	0.88	
Bowling Green	77	19	47.2	0.56	
Cambridge	76	21	46.7	1.09	
Camp Dennison	76	29	51.6	2.00	
Canal Dover	85	20	46.6	1.11	T.
Canfield	.....	.....	.....	2.25	T.
Canton†	76	24	47.6	1.01	T.
Cardington	69	23	47.9	0.77	T.
Carrollton	76	30	47.8	1.10	T.
Cedarville	.....	.....	.....	1.39	
Celina	75	32	53.2	0.46	
Cherryfork	80	21	50.4	2.23	
Circleville[b]	79	28	51.6	1.25	
Clarksville	77	24	50.7	1.20	
Cleveland	76	29	48.6	1.15	T.
Cleveland (W. B)	.....	.....	.....	.....	T.
Clifton	78	22	50.2	1.17	
Colebrook	75	22	46.8	1.52	
Dayton[a]	77	25	51.0	0.80	T.
Dayton[b]†	.....	.....	.....	0.43	
Defiance	77	21	48.1	1.40	T.
Delaware†	74	24	49.8	0.74	
Demos	75	28	48.0	1.84	0.1
Dupont	77	21	47.6	0.45	T.
Elyria	73	26	48.6	1.09	T.
Fairport Harbor*[10]	78	36	51.2	.....	
Fayetteville	75	26	50.2	1.45	T.
Findlay	79	19	48.0	0.64	
Fostoria	75	25	47.8	3.52	T.
Frankfort	78	25	49.2	1.47	
Garrettsville†	75	23	47.1	1.04	
Granville	74	22	47.8	0.96	
Gratiot	76	24	48.8	1.01	T.
Greenfield	74	29	50.8	0.55	
Greenhill	77	19	46.3	1.11	0.5
Greenville	72	25	48.6	0.46	T.
Hackney	75	26	48.7	1.72	
Hanging Rock	81	28	51.4	2.29	
Hedges	78	17	47.0	0.35	0.5
Hillhouse	77	24	46.8	2.03	1.0
Hillsboro†	81	25	51.4	1.38	T.
Hiram	75	26	46.5	1.10	T.
Hudson	76	25	48.0	1.09	
Jacksonboro	75	27	51.8	0.70	
Kenton†	77	25	49.3	0.75	
Killbuck	76	21	46.2	1.87	
Lancaster	76	26	48.3	0.95	
Leipsic	75	19	46.4	0.60	0.5
Levering	.....	.....	.....	1.04	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Ohio—Cont'd.	°	°	°	*Ins.*	*Ins.*
Logan	80	20	50.0	1.17	
Lordstown	79	24	46.3	0.89	T.
McArthur	80	25	50.1	2.52	
McConnelsville †	79	25	50.8	1.72	
Marietta *a* †				2.62	
Marietta *b*	78	28	50.8	2.49	
Marion	77	22	49.6	1.10	T.
Medina	77	21	47.6	0.83	
Milfordton	78	20	45.8	1.09	T.
Milligan	79	31	52.8	1.65	
Millport	71	27	49.8	1.20	T.
Montpelier	75	20	45.9	1.09	0.5
Napoleon	76	20	47.0	1.23	T.
Neapolis				1.52	T.
New Alexandria	75	27	47.8	1.60	T.
New Berlin	75	22	47.8	0.75	T.
New Bremen				0.15	
New Comerstown	72	23	46.5	0.82	T.
New Holland	79	26	50.0	0.91	
New Moscow				0.94	
New Paris	78	26	52.8	0.81	T.
New Waterford				1.39	0.5
North Lewisburg	77	23	49.4	0.70	
North Royalton	77	24	48.4	1.50	
Norwalk	78	22	48.0	0.97	
Oberlin				0.67	T.
Ohio State University	75	23	48.7	0.80	
Orangeville	75	21	45.1	0.63	T.
Ottawa	80	23	50.4	0.49	T.
Pataskala †	78	22	48.4	0.96	T.
Perry				1.88	0.5
Philo	77	24	48.9	1.20	T.
Plattsburg	76	23	50.1	1.42	
Pomeroy	77	28	50.3	2.06	T.
Portsmouth *a* †				2.92	
Portsmouth *b*	84	29	54.2	2.61	
Richwood				0.42	
Ridgeville Corners	77	20	47.6	0.87	
Ripley	75	29	50.8	2.21	
Rittman	75	19	45.2	0.70	
Rockyridge	77	23	48.8	0.95	
Rosewood	74	24	48.3	0.23	
Sandusky					T.
Sharon Center				0.95	
Shenandoah	75	20	46.2	0.79	0.4
Sidney *b*	77	25	48.0	0.77	
Sinking Spring †	75	29	51.4	2.17	
Springboro				1.13	
Spring Valley	75	20	47.8	1.45	
Strongsville				0.73	0.2
Sylvania	73	19	45.3	1.88	
Thurman	79	26	52.0	2.24	
Tiffin †	73	26	48.6	0.89	T.
Toledo					T.
Upper Sandusky	74	25	48.5	0.53	T.
Urbana	74	26	48.6	0.38	
Van Wert	79	22	48.2	0.53	T.
Vermilion	75	24	49.9	1.08	1.0
Vickery	75	24	48.8	0.82	T.
Walnut				1.09	
Warren	77	23	46.4	0.83	
Wauseon	78	20	47.5	1.20	0.1
Waverly	80	26	51.6	2.16	T.
Waynesville	76	24	51.1	1.26	
Westerville	74	26	49.0	0.88	T.
Willoughby				1.10	0.3
Wooster *a*	75	21	48.8	0.71	T.
Youngstown	76	25	46.4	0.95	
Oklahoma.					
Alva †	90	32	58.4	5.50	
Anadarko †	98	34	63.5	3.55	
Arapaho †	90	32	58.7	2.37	
Beaver †	89	27	56.0	1.35	T.
Burnett †	93	32	59.0	1.63	
Clifton †	93	31	59.0	1.21	
Edmond				2.32	
Fort Reno †	91	35	60.6	2.18	
Fort Sill	95	36	61.5	1.55	
Guthrie †	89	35	60.9	3.10	
Hennessey †	97			1.85	
Keokuk Falls †	91	28	57.8	1.21	
Mangum †	92	35	61.8	1.87	
Norman †	93	35	61.0	1.45	
Pondcreek †	97	34	59.6	5.85	
Prudence †	93	33	60.5	6.16	
Sac and Fox Agency †	91	30	57.4	1.80	
Stillwater †	91	34	59.2	2.88	
Winnview †	90	34	57.2	1.96	
Oregon.					
Arlington †	80	32	54.0	0.26	
Ashland *b*	81	30	54.6	0.94	
Aurora [8]	80	29	56.4	2.59	
Aurora (near)	79	33	53.0	2.78	
Bandon	63	35	52.0	2.78	
Bay City †	70	40	53.7	6.30	
Brownsville [8]	84	40	55.5	2.88	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Oregon—Cont'd.	°	°	°	*Ins.*	*Ins.*
Burns †	84	15	43.2	0.00	
Comstock [8]	79	31	50.5	3.95	
Corvallis *a*	79	32	52.8	3.30	
Dayville †	88	25	51.8	0.55	
Detroit †	73[e]	32[e]	50.0[e]	4.97	
Eugene † *a*	80	38	54.4		
Falls City				5.50	
Fife †	81	22	48.2	0.10	
Forest Grove	84	30	53.4	2.78	
Fort Klamath	76	20	45.0	2.16	1.0
Gardiner	72	41	53.8	4.82	
Government Camp	75	27	46.2	5.25	8.0
Grants Pass *a* †	83	29	54.2	2.13	
Happy Valley †	85	16	47.0	0.89	4.0
Hood River (near)	76	36	52.0	1.81	
Hubbard	75	31	51.6	2.45	
Irvington				1.53	
Jacksonville	77	30	53.2	1.28	
Junction City [8]	86	38	55.9	3.45	
Lafayette [8]	82	37	57.5	2.29	
Lakeview †	77	23	47.9	0.60	
Langlois	82	40	57.0	4.75	
McMinnville †	80	31	53.6	2.91	
Merlin [8]	86	30	52.3	1.19	
Monmouth [8]	80	40	53.6	2.46	
Mount Angel †	80	36	54.3	2.78	
Nehalem				6.71	
Newberg	83	31	54.4	3.03	
Newbridge	84	28	54.0	0.04	
Newport	71	39	52.8	5.79	
Pendleton	86	27	51.6	1.07	
Riddles [8]	80	28	50.2	1.37	
Salem *b* †	78	36	54.0	2.97	
Sheridan [8]	77	38	55.4	2.76	
Silver Lake	82	15	45.3	0.49	
Silverton [8]	78	38	51.9	2.88	
Siskiyou [8]	75	36	54.1	1.90	
Sparta	76	28	48.3	1.22	
Springfield [8]	75	38	52.9	2.81	
Stafford	82	35	55.4	2.77	
The Dalles †	79	35	54.0	0.60	
Toledo	78	34	54.0	5.31	
Umatilla †				0.36	
Vale	83	19	49.0	0.20	
Vernonia	77	33	52.2	2.88	
West Fork [8]	76	36	53.7	1.92	
Weston	82	20	48.8	1.72	
Williams	78	27	52.1	1.36	
Pennsylvania.					
Altoona	73	32	50.7	1.66	
Aqueduct	75	27	50.4	4.33	
Beaver Dam †				1.54	
Bethlehem				2.77	
Blooming Grove	69	18	44.1	3.81	
Brookville †	70	33	52.3	3.19	
Browers Lock				3.47	
Cameron				3.83	
Canonsburg [e]	81	28	52.2	0.74	T.
Carlisle	75	27	50.7	2.78	
Cassandra	69	25	46.0	2.89	T.
Cedarrun				4.21	
Centerhall †	79	27	47.5	3.92	
Chambersburg †	73	23	48.2	1.52	
Coatesville	78	26	50.1	2.96	
Confluence †	75	28	47.9	2.52	
Coopersburg	79	31	52.2	3.29	
Davis Island Dam †				2.12	T.
Derry Station	74[d]	28[d]	49.0[d]	3.11	
Doylestown				2.19	
Driftwood				3.26	
Dubois †				3.05	
Duncannon				4.46	
Dyberry †	72	22	45.7	3.07	T.
East Bloomsburg				4.09	
East Mauch Chunk	73	23	48.3	4.13	
Easton	68	29	49.6	2.38	
Edinboro [1]	70	26	45.0		T.
Ellwood Junction †				0.94	T.
Emporium	74	24	46.0	3.31	T.
Erie					3.0
Farrandsville				5.26	
Forks of Neshaminy [1]	71	32	50.8	2.17	
Frederick				4.05	
Freeport †				2.42	
Girardville				5.55	
Grampian	72	24	45.6	2.62	
Greensboro †	80	25	49.4	3.20	T.
Hallstead †	72	25	45.6	3.28	
Hamburg	72	28	51.0	4.25	
Hollidaysburg	77	23	48.2	1.81	
Honesdale				3.29	
Huntingdon *a* †	78	26	49.0	2.12	
Huntingdon *b*				2.24	
Indiana	76	36	49.4	3.27	
Irwin	84	31	54.0	2.82	T.
Johnstown †	76	28	48.8	3.15	T.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Pennsylvania—Cont'd.	°	°	°	*Ins.*	*Ins.*
Karthaus				1.73	
Keating				3.47	
Kennett Square	77	28	51.6	2.51	
Lancaster	73	29	53.0		
Lansdale				3.55	
Lebanon	76	27	50.7	4.70	
Leroy †	77	26	45.8	5.04	T.
Lewisburg	73	26	48.0	5.58	
Lock Haven *a* †	81	26	50.8	4.92	
Lock Haven *b*				4.44	
Lock No. 4 †				3.19	
Lycippus	77	30[e]	48.4[e]	3.18	
Mifflin				3.20	
Oil City †				2.15	
Ottsville				2.55	
Parker †				2.21	T.
Philadelphia *b*	79	35	53.6	2.77	
Pittsburg					T.
Point Pleasant				2.25	
Pottstown	74	30	51.6	3.95	
Quakertown	71	25	49.0	3.50	
Reading [3]			48.8	2.81	
Renovo *a*				4.21	
Renovo *b*	76	26	48.2	4.15	
Ridgway †				2.91	
Saegerstown	78	19	45.2	2.25	T.
St. Marys	75	23	44.6	1.63	
Scranton	73	25	47.7	4.83	
Seisholtzville				5.40	
Selinsgrove	74	25	48.6	4.36	
Shawmont				2.96	
Shinglehouse	76	19	45.2	3.80	1.0
Sinnamahoning				3.35	
Skippack	75	25	49.8		
Smethport	75	20	44.6	3.52	T.
Smiths Corners				2.39	
Somerset	72			2.72	T.
South Bethlehem [1]	69	34	54.4		
South Eaton	72	26	47.8	4.94	
State College	72	26	47.2	3.29	
Sunbury				3.28	
Swarthmore	71	33	51.8	1.64	
Towanda	74	23	46.6	5.57	
Uniontown	78	28	50.7	3.64	T.
Warren †	86	25	48.8	2.72	T.
Wellsboro [1]	75	18	42.1	5.40	T.
West Chester	73	32	51.5	2.14	
West Newton †				2.89	
Westtown	72	29	50.4	2.40	
White Haven [1]	72	29	45.9[e]	4.08	
Wilkesbarre †	72	26	48.4	2.74	
Williamsport	70	27	48.3	5.70	
York †	75	26	50.3	3.44	
Rhode Island.					
Bristol	70	30	49.6	3.14	
Kingston	77	27	48.2	4.20	
Lonsdale				2.72	
Pawtucket	76	29	49.3	2.90	
Providence *c*	76	29	48.9	2.78	
South Carolina.					
Allendale †	82	38	62.2	0.38	
Anderson †				1.85	
Batesburg †	83	35	62.2	0.85	
Blackville †	84	38	63.8	0.40	
Camden †				0.42	
Central †	83	30	59.5	1.89	
Cheraw *a* †	81	31	59.2	1.64	
Cheraw *b* †				2.34	
Clemson College	88	30	60.8	1.88	
Conway †				1.03	
Darlington (near)				1.33	
Edisto †				0.79	
Effingham †				1.43	
Florence †	84	33	60.1	0.63	
Georgetown †	81	44	63.2	1.66	
Gillisonville †	88	34	65.3	1.18	
Greenville †	83	32	59.2	2.73	
Holland †	82[d]	28[d]	59.7[d]	2.21	
Kingstree *a* †	83	34	61.5	0.50	
Kingstree *b* †				0.48	
Little Mountain	91	39	64.9	1.50	
Longshore †	81	37	61.5	2.57	
Mount Carmel †				2.37	
Pinopolis [1]	80	44	62.0	1.25	
Port Royal †	83	49	67.3	1.44	
St. George †	84	40	62.8	0.55	
St. Matthews †	90	38	63.7	1.34	
St. Stephens †				0.64	
Santuck †	80	30	59.2	1.52	
Shaws Fork [1]	90	36	66.6	1.25	
Smiths Mills †				1.46	
Society Hill †	80	36	60.8	1.11	
Spartanburg †	82	34	60.6	2.75	
Statesburg †	81	39	62.8	0.74	
Trenton	90	44	64.6	0.84	
Trial †	87	37	64.2	0.81	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
South Carolina—Cont'd.	°	°	°	*Ins.*	*Ins.*
Walhalla†	78	34	59.2	1.69	
Winnsboro	85	36	59.7	1.16	
Yemassee†	85	40	64.6	1.47	
Yorkville	83	37	61.3	1.58	
South Dakota.					
Aberdeen†	80	11	46.2	3.62	6.0
Alexandria†	84	14	46.5	3.15	3.0
Armour†	82	15	46.2	2.70	6.0
Ashcroft†	86	12	42.8	0.46	T.
Brookings*†	80	7	39.6	1.83	2.0
Canton†	80	15[a]	.....	3.19	T
Castlewood†	80[a]	11[a]	42.7[a]	2.03	2.0
Chamberlain†	84	18	47.0	1.65	8.0
Cross†	79	17	43.6	0.83	7.2
Edgemont	.....	.....	.....	0.05	T.
Farmingdale	.....	.....	.....	0.33	2.5
Faulkton *a*†	84	12	42.3	2.00	12.0
Flandreau†	85	17	44.6	2.32	2.8
Forestburg†	84	14	45.0	1.96	6.0
Forest City†	85	15	45.8	.....	.....
Fort Meade†	80	22	48.4	T.	T.
Gary†	78	19	44.4	2.74	2.0
Goudyville*†	85	12	40.9[a]	0.53	.....
Greenwood†*	86	18	47.8	2.18	3.0
Hotch City†	89	14	45.2	0.49	5.0
Howard†	81	18	44.0	2.20	2.0
Huron	.....	.....	.....	.....	6.0
Kimball†	84	16	45.9	2.28	8.0
Leslie†	88	9	45.2	0.10	.....
Mellette†	86	11	42.6	8.35	6.0
Menno†	87	16	46.4	3.28	2.0
Millbank	.....	.....	.....	2.09	.....
Mitchell†	82	17	45.7	3.34	3.0
Nowlin†	87	12	44.8	T.	
Oelrichs†	85	15	47.5	0.65	4.5
Parker†	80	17	43.9	3.03	0.5
Parkston†	86	15	45.0	2.03	3.0
Pierre	.....	.....	.....	.....	3.5
Plankinton†	.....	15	.....	2.18	4.0
Rapid City	.....	.....	.....	.....	2.8
Rochford	.....	.....	.....	0.75	5.0
Rosebud*†	80	15	43.1	.....	.....
St. Lawrence†	85	12	45.0	1.50	6.0
Silver City	.....	.....	.....	0.62	4.1
Sioux Falls†	78	18	44.5	3.39	1.0
Spearfish†	76	24	46.5	0.52	4.5
Tyndall†	78	20	48.2	4.49	2.0
Watertown†	80	10	40.7	1.43	4.0
Webster†	80	6	41.2	2.79	8.2
Wentworth†	79	16	44.0	2.91	3.0
Yankton†	88	22	47.8	2.83	.....
Tennessee.					
Andersonville*†	79	30	56.2	1.60	
Arlington†	86	30	58.4	2.32	
Ashwood*†	79	35	59.3	1.85	
Benton (near)†	88	30	58.4	1.48	
Bolivar†	84	28	58.2	1.89	
Bristol†	73	27	52.9	1.05	
Brownsville†	82	36	59.0	3.56	
Cagle	.....	.....	.....	1.24	
Carthage†	.....	.....	.....	0.86	
Clarksville	80	31	57.8	1.34	
Clinton†	.....	.....	.....	2.07	
Covington†[f]	85	35	60.2	0.84	
Decatur†	83[d]	30[d]	56.8[d]	0.95	
Dyersburg†	86	30	59.0	2.53	
Elizabethton†	80	28	56.6	1.27	
Elk Valley*†	75	32	54.9	0.70	
Fairmount*†	73	37	56.2	1.70	
Florence†	78	33	57.4	1.30	
Greeneville†	76	29	56.2	1.18	
Hohenwald†	81	30	56.2	1.51	
Jackson†	82	30	58.4	1.95	
Johnsonville†	.....	28	.....	1.46	
Jonesboro*†‖	73	30	53.2	1.02	
Liberty†	81	33	58.4	1.18	
Loudon†	.....	.....	.....	1.47	
Lynnville*‖	80	32	56.7	1.16	
McKenzie*†	79	35	58.6	1.13	
McMinnville†	81	33	56.0	2.58	
Milan†	82	30	59.0	1.06	
Molino†	78	33	58.2	0.90	
Newport†	80	29	56.0	1.13	
Nunnelly*‖	80	30	57.6	1.34	
Palmetto†	82	33	60.2	0.77	
Pope*‖	84	32	58.3	1.18	
Riddleton†	77	32	57.9	0.67	
Rockwood†	.....	.....	.....	1.21	
Rogersville†	81	29	55.7	2.14	
Rugby*‖	75	40	54.4	0.51	
St. Joseph†	87	27	59.4	2.28	
Sewanee†	71	33	56.1	2.18	
Springdale*‖	82	28	54.7	1.80	
Teilico Plains†	81	30	57.8	1.71	
Trenton	80	28	57.4	1.77	
Tullahoma†	76	31	55.8	1.15	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Tennessee—Cont'd.	°	°	°	*Ins.*	*Ins.*
Union City†	81	30	57.5	1.91	
Waynesboro*‖	82	29	57.7	1.95	
Texas.					
Albany*†‖	78	43	57.4	2.97	
Alice†	95	55	73.7	4.77	
Arthur City†	.....	.....	.....	2.62	
Austin *b*§	88	47	65.2	.....	
Ballinger†	86	36	60.2	4.92	
Beeville†	92	50	70.2	4.73	
Blanco†	88	46	66.2	4.52	
Boerne*†‖	81	49	64.0	4.86	
Brazoria†	88	52	70.2	3.99	
Brenham†	88	49	68.6	1.90	
Brighton†	85[c]	56	71.1[c]	3.74	
Brownwood*†§	84	48	62.4	8.23	
Burnet*†‖	88	48	65.6	2.97	
Camp Eagle Pass†	90	53	73.5	3.35	
Coleman*§	.....	45	61.1	4.18	
College Station	85	46	67.0	3.42	
Colmesneil	.....	.....	.....	3.72	
Columbia†	87	46	67.6	3.42	
Corsicana *b*†	90	40	64.9	3.86	
Cuero†	87	50	69.1	5.46	
Dallas†	89	41	63.1	4.22	
Danevang†	90	47	70.2	5.09	
Dublin†	83	42	61.8	3.80	
Durham†	.....	.....	.....	8.01	
Duval*‖	90	52	69.5	3.71	
Estelle†	92	37	63.9	4.76	
Forestburg†	90	39	61.6	2.80	
Fort Brown†	90	56	72.4	3.48	
Fort Clark	84	46	65.7	3.69	
Fort McIntosh	87	52	69.6	3.02	
Fort Ringgold†	92	51	71.6	4.70	
Fort Worth†[f]	90[c]	40[c]	64.4[c]	4.67	
Fredericksburg*†‖	83[c]	45[c]	62.9[c]	4.29	
Gainesville†	91	38	63.5	3.05	
Georgetown*‖	86[d]	44	63.3[d]	3.08	
Golindo	.....	.....	.....	6.80	
Grapevine†	90	40	62.8	4.66	
Hale Center†	83	37	58.5	.....	
Hallettsville†	88	51	67.2	4.37	
Henrietta†	95	40	64.4	0.89	
Hewitt	.....	.....	.....	7.60	
Houston†	87	52	69.2	3.10	
Huntsville†	87	45	66.3	4.64	
Kent	.....	.....	.....	2.18	
Kerrville†	84	41	62.3	4.67	
Lampasas†	87	40	61.6	5.83	
Leakey†	83[1]	48[1]	66.1[1]	4.27	
Llano*†§	86	48	66.3	6.00	
Longview†	91	44	65.8	6.66	
Lufkin†	97	44	67.9	4.47	
Luling†	86	50	68.2	4.30	
Marathon†	92	39	61.4	4.42	
Menardville†	85	35	60.1	6.21	
Mount Blanco*†	83[a]	33	56.0	2.40	
New Braunfels†	85	50	65.2	6.19	
Orange†	89	42	67.2	1.22	
Panter†	.....	.....	.....	6.14	
Paris†	96	39	64.8	2.72	
Point Isabel*‖	86	64	76.9	1.85	
Rheinland†	89	39	62.8	2.20	
Roby†	.....	.....	.....	5.78	
Round Rock*†§	88	52	70.6	3.60	
Runge†	91	49	70.2	3.76	
San Antonio	88	51	68.9	6.41	
Sandersont	83	37	61.8	6.30	
San Marcos *a*†	.....	.....	.....	4.58	
San Marcos *b*†	85	49	66.6	4.78	
Sierra Blanca†	83	33	58.1	2.75	
Stafford†	88	46	67.5	4.56	
Sulphur Springs†	100	37	66.1	5.89	
Temple *a*†	88	47	66.0	3.83	
Tulia†	95	29	55.6	4.01	
Tyler†	86	42	64.0	4.85	
Victoria	.....	.....	.....	2.90	
Waco†	87	46	65.8	8.90	
Weatherford†	87	41	64.4	3.50	
Wichita Falls†	.....	.....	.....	1.07	
Utah.					
Alpine City†	.....	.....	.....	0.31	
Blue Creek*§	96	29	52.6	T.	
Brigham City†	.....	.....	.....	1.52	
Cisco†	82	28	54.2	0.88	
Corinne*§	87	32	58.4	0.48	
Fillmore†	91	24	54.2	0.37	
Fort Duchesne†	78	21	48.0	0.54	
Giles†	82	13	52.0	0.17	
Grover†	78	17	48.4	0.65	T.
Huntsville†	.....	.....	.....	0.77	
Kelton*§	74	29	48.1	0.00	
Levan†	78	25	49.9	0.50	
Loa†	75	12	43.4	0.42	0.5
Logan†	81[a]	30	53.0[a]	0.68	
Mammoth†	76	27	52.0	0.10	1.0

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Utah—Cont'd.	°	°	°	*Ins.*	*Ins.*
Manti†	90	18	51.7	0.64	
Millville†	.....	.....	.....	0.97	
Moab†	77	30	53.6	0.83	
Mount Pleasant*†‖	82	28	55.5	0.46	
Ogden *a*§	88	32	54.2	0.70	
Pahreah†	84	20	53.8	1.30	
Park City†	66	11	43.4	0.72	6.0
Parowan†	79	24	51.1	0.36	1.0
Promontory*§	79	28	53.6	0.15	
Richfield†	82	22	50.0	0.55	
St. George†	94	25	59.4	0.11	
Scipio†	79	20	48.8	1.53	0.5
Snowville†	80	20	48.0	0.93	
Soldier Summit†	83	15	41.0	0.60	6.0
Terrace*§	85	28	54.6	0.00	
Thistle†	78	23	48.3	0.47	
Tooele†	78	31	52.5	0.92	
Vernal†	70	26	48.1	0.69	
Vermont.					
Brattleboro	72	26	46.8	2.37	
Burlington†	66	31	47.2	2.52	T.
Chelsea†	66	20	42.2	2.21	T.
Cornwall	72	27	46.1	2.61	
Enosburg Falls	72	22	43.8	3.31	
Hartland†	68	20	43.8	4.61	0.5
Jacksonville	71	19	43.0	3.57	.....
Northfield	.....	.....	.....	.....	0.2
Norwich	67	19	43.6	4.03	1.0
St. Johnsbury	70	21	43.7	2.41	T.
Strafford*†‖	68	25	42.7	3.30	1.0
Vernon*§	74	24	46.5	2.51	
Wells	66	24	44.4	3.62	
Woodstock	68	19	43.9	3.54	1.0
Virginia.					
Alexandria‖	77[a]	32	54.1	0.40	
Ashland†	85	27	55.0	0.56	
Barboursville	76	30	53.2	0.28	
Bedford City†	83	34	61.3	.....	
Bigstone Gap†	77	23	51.1	2.71	
Birdsnest*†‖	80	38	58.4	2.90	
Blacksburg	73	23	50.4	1.16	
Buckingham†	77	26	53.6	0.29	
Callaville†	77	30	56.3	1.29	
Charlottesville	78	32	55.8	0.25	
Christiansburg†	.....	.....	.....	1.15	
Clifton Forge	72	27	48.5	0.28	
Dale Enterprise†	75	25	50.8	0.16	
Doswell	82	25	51.5	.....	
Fredericksburg†	77	32	55.4	0.14	
Hampton	77	40	59.6	1.90	
Hot Springs	70	27	50.2	0.47	
Lexington†	80	27	54.3	0.31	
Manassas†	79	28	53.8	0.24	
Marion†	71	25	50.6[b]	0.50	
Nottoway†	82	28	57.2	0.90	
Petersburg†	83	30	57.9	0.63	
Quantico	77	28	53.4	.....	
Richmond (near)†	84	31	58.3	0.89	
Rockymount†	85	32	57.0	0.50	
Salem†	83	31	57.7	0.53	
Saltville	75	24	52.8	1.55	
Smithville†	74	33	56.4	0.52	
Spottsville†	76	30	55.2	1.38	
Stanardsville†	78	21	53.5	0.11	
Staunton†	79	29	53.8	0.23	
Stephens City†	79	30	52.6	0.86	
Sunbeam†	77	33	54.8	1.18	
Warsaw†	78	28	55.6	0.87	
Westbrook Farm	77	31	55.0	.....	
Woodstock†	80	28	51.8	0.82	
Washington.					
Anacortes	.....	.....	.....	2.88	
Ashford†	.....	.....	.....	4.56	T.
Blaine†	72	25	47.2	3.62	
Cascade Tunnel†	55	18	36.0	2.37	36.0
Centerville†	85	21	51.2	0.36	
Chehalis†	78	35	53.4	3.60	
Colfax†	76	26	48.4	1.26	
Connell†*	82	28	55.2	.....	
Coupeville†	70	34	49.4	1.75	
Eastsound†	66	38[a]	49.8[a]	2.51	
Ellensburg†	75	20	46.4	0.22	
Ellensburg (near)	76	26	48.4	0.12	
Fort Simcoe†	80	34	55.0	0.03	
Fort Spokane	77	13	47.6	0.95	
Grandmound†	72	33	51.4	2.72	
Hunters†	66	23	42.4	1.29	T.
Kennewick†	85	33	55.7	0.24	
Lakeside†	70	33	50.6	1.00	
Lapush†	66	35	51.4	6.80	
Loomis†	73	24	48.8	1.05	
Madrone*†‖	70	35	51.4	2.84	
Mayfield†	72[a]	35[a]	49.8[a]	3.65	
Montecristo†	73	34	48.2	5.85	4.0
Moxee Valley†	81	26	50.1	0.10	
New Whatcom†	75	30	51.4	1.96	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Washington—Cont'd.	°	°	°	*Ins.*	*Ins.*
Olympia†	71	33	52.0	3.88	
Pine Hill†	76	33	51.4	1.12	
Pomeroy†	80	33	55.4	0.70	
Pullman†	77	25	48.6	0.90	
Queets†	69	34	51.0	7.88	
Rosalia†	75	30	47.8	1.37	
Sedro†	78	30	52.6	4.59	
Shoalwater Bay*[10]	67	44	55.2	.....	
Silvercreek*[1]	74	35	49.5	4.09	
Snohomish†	76	33	52.6	3.33	
Stampede†	73	31	48.6	3.89	4.0
Sunnyside†	82	30	51.2	0.42	
Tacoma†	69	35	51.0	2.74	
Union City†[1]	74	34*	49.0	4.90	
Vashon†	66	38	51.6	3.36	
Waterville†	75	24	46.6	0.81	
Wenatchee Lake†	72	25	44.8	0.70	
West Ferndale†	72	32	52.2	2.79	
West Virginia.					
Beverly†	76	26	48.3	2.20	
Bloomery†	73	23	48.6	1.08	
Bluefield†	78	30	52.4	1.39	
Buckhannon *a*†	.....	.....	.....	3.31	
Burlington†	76	24	49.0	0.95	
Charleston†	.....	.....	.....	2.54	
Creston†	72	26	49.4	2.70	
Dayton†	.....	.....	.....	1.59	
Elkhorn†	75	29	51.2	1.78	
Fairmont†	.....	.....	.....	2.95	
Glenville†	79	28	49.9	3.74	
Grafton†	80	24	50.3	2.83	T.
Green Sulphur	78	27	53.2	0.53	
Harpers Ferry†	.....	.....	.....	0.88	
Hewett†	80	30	55.4	2.13	
Hinton *a*†	.....	.....	.....	1.03	
Hinton *b*†	76	29	53.1	.....	
Marlinton†	72	20	47.4	1.22	
Martinsburg†	73	29	52.4	1.13	
Morgantown *a*†	.....	.....	.....	3.00	
Morgantown *b*†	82	25	51.6	3.08	
New Martinsville†	80	28	51.3	2.18	
Nuttallburg†	79	36	53.2	2.60	T.
Oldfields†	77	25	49.8	0.45	
Pennsboro	80	25	51.5	3.35	
Philippi†	80	30	54.8	2.20	
Point Pleasant†	79	31	52.0	2.45	
Powellton†	79	31	52.2	2.09	
Rowlesburg†	.....	.....	.....	2.93	
Tannery*[1]	75	25	45.9	.....	0.5
Weston *a*†	.....	.....	.....	4.37	
Weston *b**[1]	75	30	50.1	.....	T.
Wheeling *a*†	.....	.....	.....	2.15	T.
Wheeling *b*†	77	32	51.6	2.01	
White Sulphur Springs†	78	20	50.0	0.90	
Wisconsin.					
Amherst	71	15	43.0	2.38	3.0
Antigo†	72	5	39.0	3.26	6.8
Apollonia*†[1]	78	11	45.5	3.82	1.1
Beloit	73	23	46.1	0.67	T.
Boscobel†	73	17	46.6	1.90	T.
Chilton	71	21	44.9	1.32	0.3
Crandon†	71	10	40.1	1.47	6.2
Delavan†	72	20	45.4	0.79	T.
Dodgeville†	.....	13	.....	3.29	
Easton†	72	10	42.8	2.45	T.
Eau Claire	75	12	44.6	3.00	
Florence†	71	14	40.1	2.94	3.0
Grand River Lock	.....	.....	.....	1.54	.....
Grantsburg†	.....	12	.....	4.22	0.2
Gratiot†	72	20	45.8	2.30	
Greenbay	.....	.....	.....	.....	2.2
Hartford	.....	.....	.....	2.17	T.
Hayward†	75	10	41.2	1.51	8.7
Hillsboro	74	11	42.2	3.10	2.0
Koepenick*†[1]	68	18	42.0	3.90	9.0
La Crosse	.....	.....	.....	.....	6.8
Lancaster†	70	16	44.8	2.49	T.
Lincoln†[2]	.....	.....	46.2	0.88	1.5
Madison†	68	24	46.2	1.69	T.
Manitowoc†	68	22	44.2	1.31	T.
Meadow Valley†	74	12	43.8	2.77	
Medford†	74	6	40.8	2.45	0.5
Menasha	.....	.....	.....	0.12	T.
Milwaukee	.....	.....	.....	.....	T.
Nellisville†	79	10	42.8	3.73	2.0
New London	71	20	44.3	2.15	T.
Oconto	70	19	44.0	3.74	1.0
Wisconsin—Cont'd.	°	°	°	*Ins.*	*Ins.*
Osceola†	76	10	44.2	3.54	0.3
Oshkosh†	71	21	45.0	2.42	0.2
Pepin	72	10	43.0	2.66	T.
Pine River†	74	18	45.0	2.24	T.
Portage†	73	17	44.9	1.53	T.
Port Washington	75	21	46.6	1.00	
Racine	75	25	47.5	0.71	
Sharon†	73	19	43.2	0.74	T.
Spooner†	74	.....	.....	3.46	6.0
Stevens Point†	73	15	43.8	2.38	3.0
Sturgeon Bay Canal*[10]	62	22	43.5	.....	.....
Valley Junction†	73	11	43.5	3.05	T.
Viroqua	72	16	45.6	3.34	1.0
Watertown†	72	21	45.0	0.80	0.2
Waukesha†	71	25	46.0	0.68	1.0
Waupaca†	71	16	43.6	2.76	T.
Wausau†	68	16	42.0	2.91	4.0
Westbend	74	18	43.1	0.97	1.0
Westfield†	72	15	43.8	2.36	
White Mound†	73	11	44.4	2.60	T.
Wyoming.					
Cheyenne	.....	.....	.....	.....	2.8
Fort Laramie†	86	10	46.9	0.83	3.5
Fort Washakie†	79	10	44.0	0.46	4.6
Fort Yellowstone†	73	19	41.5	0.06	T.
Lander	.....	.....	.....	.....	6.7
Laramie	74	17	41.9	0.18	T.
Lusk†	77	15	43.1	0.87	.....
Sheridan	82	15	44.6	0.62	0.5
Sundance	75	18	43.0	0.66	3.0
Wheatland†	89	23	50.8	0.12	1.2
Mexico.					
Ciudad P. Diaz	85	54	69.8	3.21	
Leon de Aldamas	82	52	66.3	1.26	
Puebla	80	51	65.5	3.11	
Topolobampo*[1]	92	71	81.2	0.83	
New Brunswick.					
St. John	59	29	46.0	7.83	
West Indies.					
Grand Turk Island	.....	.....	.....	0.28	

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	°	°	°	*Ins.*	*Ins.*
Alaska.					
Juneau	73	34	50.8	14.08	
Arizona.					
Mount Huachuca	89	46	70.5	2.83	
California.					
Agnews	.....	.....	.....	0.27	
Bishop Creek*[8]	94	49	70.6	0.05	
Chino†[6]	90	52	70.3	0.00	
Corning*[3]	98	55	71.1	0.75	
Delta*[5]	99	54	68.8	T.	
Fort Ross	..	.....	.....	0.30	
Fort Tejon	.....	.....	.....	0.53	
Pomona (near)	103	45	70.2	0.00	
Salton*[8]	116	62	87.3	0.00	
San Miguel Island	74	53	61.0	0.21	
Saticoy	.....	.....	.....	0.00	
Engineers Quarters‡	.....	.....	.....	0.00	
Morses House‡	.....	.....	.....	0.00	
Grass Valley‡	.....	.....	.....	0.00	
Deep Creek‡	.....	.....	.....	0.00	
Holcomb Creek‡	.....	.....	.....	0.00	
Squirrel Inn‡	.....	.....	.....	0.00	
Green Valley‡	.....	.....	.....	0.00	
Tunnel No. 2‡	.....	.....	.....	0.00	
Iowa.					
Greenfield	85	33	59.8	4.68	
Kansas.					
Blaine	93	35	62.4	6.88	
Burlington	97	32	66.0	3.96	
Girard*[1]	98	44	67.0	4.13	
Lakin	.....	.....	.....	0.80	
Lyons	100	32	66.2	1.60	
Winfield*[5]	104	32	69.7	3.27	
Massachusetts.					
Fiskdale	.....	.....	.....	7.26	
Long Plain*[8]	81	38	61.7	.....	
Lynn *b*	86	36	61.0	6.08	
Turners Falls	85	36	60.0	6.37	
Michigan.					
Rockland	84	32	54.5	1.70	
Minnesota.					
Campbell	95	24	54.5	2.87	
Winnebago City	82	31	55.5	4.21	
Missouri.	°	°	°	*Ins.*	*Ins.*
Oakfield	94	40	67.1	2.83	
Richmond	92	42	65.5	3.85	
Nebraska.					
Blair	.....	.....	.....	4.25	
Lincoln *c*	90	36	60.5	4.57	
State Farm	93	33	61.9	4.90	
Nevada.					
Tuscarora	82	31	52.7	0.56	
New Jersey.					
Beachhaven	84	45	66.9	1.37	
Hammonton	.....	.....	.....	3.15	
New Mexico.					
Estalina Springs	.....	.....	.....	3.48	
Springer	.....	.....	.....	2.32	
New York.					
Ogdensburg	86	30	59.2	3.64	
Victor[7]	92	31	59.7	.....	
North Carolina.					
Wilkesboro	94	37	68.4	.....	
North Dakota.					
Langdon[4]	82	21	49.3	2.20	
Lisbon	98	23	53.8	2.36	
Ohio.					
Cardington	.....	.....	.....	7.64	
Fostoria	90	32	60.2	3.69	
Hudson	89	31	61.9	4.44	
Oregon.					
Springfield*[8]	91	37	59.6	0.62	
South Dakota.					
Millbank	95	27	57.5	1.70	
Tennessee.					
Covington	99	35	72.2	4.01	
Texas.					
Tulia	100	31	67.9	2.24	
Victoria	.....	.....	.....	7.64	
Washington.					
Cascade Tunnel	80	18	40.3	.....	

EXPLANATION OF SIGNS.

* Extremes of temperature from observed readings of dry thermometer.

† Weather Bureau instruments.

‡ Record furnished by the Arrowhead Reservoir Company, in the San Bernardino Mountains, San Bernardino County, Cal., at elevations varying from 4,900 to 6,900 feet.

A numeral following the name of a station indicates the hours of observation from which the mean temperature was obtained, thus:

[1] Mean of 7 a. m. + 2 p. m. + 9 p. m. + 9 p. m. ÷ 4.
[2] Mean of 8 a. m. + 8 p. m. ÷ 2.
[3] Mean of 7 a. m. + 7 p. m. ÷ 2.
[4] Mean of 6 a. m. + 6 p. m. ÷ 2.
[5] Mean of 7 a. m. + 2 p. m. ÷ 2.
[6] Mean of readings at various hours reduced to true daily mean by special tables.
[7] Mean from hourly readings of thermograph.
[8] Mean of 7 a. m. + 2 p. m. + 9 p. m. ÷ 3.
[9] Mean of sunrise and noon.
[10] Mean of sunrise, noon, sunset, and midnight.

The absence of a numeral indicates that the mean temperature has been obtained from daily readings of the maximum and minimum thermometers.

An italic letter following the name of a station, as "Livingston *a*," "Livingston *b*," indicates that two or more observers, as the case may be, are reporting from the same station. A small roman letter following the name of a station, or in figure columns, indicates the number of days missing from the record; for instance, "$_5$" denotes 14 days missing.

No note is made of breaks in the continuity of temperature records when the same do not exceed two days. All known breaks, of whatever duration, in the precipitation record receive appropriate notice.

CORRECTIONS.

September, 1896, Table I, Savannah, Ga., make maximum velocity of wind read 75 instead of 70.

New Jersey, New Brunswick *b*, September, 1896, take out letter "c" after name and make precipitation read 4.84 instead of 3.84.

North Carolina, Mocksville, September, 1896, make precipitation read 4.89 instead of 5.09.

West Virginia, Philippi, September, 1896, make precipitation read 8.26 instead of 7.06.

North Dakota, Kelso, August, 1896, strike out all data.

TABLE III.—*Data from Canadian stations for the month of October, 1896.*

Stations.	Pressure.			Temperature.		Precipitation.		Prevailing direction of wind.	Total depth of snow.
	Mean not reduced.	Mean reduced.	Departure from normal.	Mean.	Departure from normal.	Total.	Departure from normal.		
	Inches.	*Inches.*	*Inches.*	°	°	*Inches*	*Inches.*		
St. Johns, N. F	29.98	30.12	+ .18	48.2	+ 2.4	4.11	.....	s.	0.0
Sydney, C. B. I	29.97	30.03	+ .07	49.2	+ 3.2	7.83	+ 3.55	sw.	0.0
Grindstone, G. St. L.	29.92	29.95	.....	45.8	.....	5.15	.....	n.	0.0
Halifax, N. S	29.91	30.04	+ .06	49.2	+ 3.2	15.02	+ 9.63	nw.	0.0
Grand Manan, N. B.	29.96	30.01	.....	46.6	.....	7.06	+ 2.38	w.	0.0
Yarmouth, N. S.	29.92	30.00	+ .02	48.6	+ 1.1	4.48	+ 0.45	nw.	T.
St. Andrews, N. B.	.....	.....	.....	45.4	.....	3.87	+ 0.52	nw.	0.0
Charlottet'n, P. E. I.	29.96	30.00	.....	48.0	.....	10.38	+ 5.90	ne.	0.0
Chatham, N. B	30.00	30.02	+ .06	43.4	+ 2.9	5.83	+ 1.94	e.	0.0
Father Point, Que.	30.00	30.03	+ .07	37.7	− 1.3	4.20	+ 1.58	e.	T.
Quebec, Que	29.70	30.04	+ .05	39.4	− 1.6	6.99	+ 3.34	ne.	1.5
Montreal, Que	29.82	30.03	+ .03	41.5	− 2.0	2.48	− 1.13	ne.	T.
Rockliffe, Ont	29.52	30.04	+ .02	37.4	− 1.6	1.92	− 0.78	nw.	4.6
Kingston, Ont	29.72	30.04	+ .01	43.5	− 2.5	1.70	− 1.30	ne.	....
Toronto, Ont	29.67	30.06	+ .02	43.0	− 2.5	2.17	− 0.12	nw.	1.9
White River, Ont	28.68	30.07	.....	31.6	− 4.4	2.50	+ 0.05	s.	0.8
Port Stanley, Ont	29.42	30.07	+ .04	43.0	.....	1.48	− 1.80	w.	T.
Saugeen, Ont	29.32	30.05	+ .05	42.0	− 3.0	1.79	− 2.02	n.	2.9
Parry Sound, Ont.	29.33	30.04	+ .03	41.0	− 1.5	2.47	− 1.85	n.	3.4
Port Arthur, Ont	29.28	30.00	.00	36.6	− 0.9	3.15	+ 0.46	nw.	1.1
Winnipeg, Man	29.18	30.03	+ .04	35.0	− 1.5	1.01	− 0.72	n.	0.5
Minnedosa, Man	28.21	30.06	+ .09	34.5	+ 1.0	0.44	− 1.12	n.	4.2
Qu'Appelle, Assin.	27.76	30.07	+ .10	34.8	− 1.7	T.	− 1.02	s.	T.
Medicine Hat, Assin	27.67	29.99	+ .03	42.8	+ 0.8	0.55	+ 0.11	s.	0.0
Swift Curr't, Assin.	27.42	30.03	+ .04	39.6	+ 1.6	0.02	− 1.21	s.	0.0
Calgary, Alberta	26.40	29.98	+ .02	39.0	0.0	0.70	+ 0.34	w.	2.4
Prince Albert, Sask.	28.38	29.93	.....	34.6	.....	0.16	.....	e.	0.0
Edmonton, Alberta.	27.64	30.01	+ .05	38.9	− 1.1	0.17	− 0.40	w.	0.0
Battleford, Sask	28.26	30.02	... .	37.2	.....	T.	.....	se.	....
Kamloops, B. C.*	28.80	30.05	... .	46.7	.....	0.44	.....	e.	...
Hamilton, Bermuda	29.89	30.05	+ .03	72.6	... .	6.79	.....	n.	0.0
Banff, Alberta	25.37	30.07	.....	36.2	.....	0.41	.....	sw.	1.7
Esquimalt, B. C.	29.99	30.02	.....	47.6	.. ..	2.87	.....	s.	0.0
Ottawa, Ont	29.72	30.09	.....	40.0	.....	1.24	.....	ne.	....

*Kamloops, 85 miles east of Spences Bridge.

TABLE IV.—*Meteorological observations at Honolulu, Republic of Hawaii, by Curtis J. Lyons, Meteorologist to the Government Survey.*

Pressure is corrected for temperature and reduced to sea level, but the gravity correction, −0.06, is still to be applied.

The average direction and force of the wind and the average cloudiness for the whole day are given unless they have varied more than usual, in which case the extremes are given. The scale of wind force is 0 to 10. Two directions of wind, connected by a dash, indicate change from one to the other; also same for force.

The rainfall for twenty-four hours is given as measured at 6 a. m. on the respective dates.

October, 1896.	Pressure at sea level.			Temperature.					Relative humidity.			Wind.		Cloudiness.	Rain measured at 6 a. m.
	9 a. m.	3 p. m.	9 p. m.	6 a. m.	2 p. m.	9 p. m.	Maximum.	Minimum.	6 a. m.	2 p. m.	9 p. m.	Direction.	Force.		
	Ins.	*Ins.*	*Ins.*	°	°	°	°	°	%	%	%				*Ins.*
1	30.04	29.98	30.04	73	81	74	84	71	77	59	76	nne.	2	6	0.10
2	30.06	29.98	30.02	72	80	73	82	71	86	59	83	ne.	3	6	0.19
3	30.00	29.93	29.98	70	82	75	84	70	84	55	70	ne.	3	4	0.10
4	30.00	29.93	30.00	73	83	76	86	71	74	53	64	ne.	2	3	0.09
5	30.04	29.97	30.04	71	82	73	84	70	83	55	84	ne.	2	4	0.12
6	30.05	30.01	30.07	73	79	76	82	71	57	80	68	ne.	2	7	0.13
7	30.09	30.02	30.07	74	79	74	83	72	73	78	73	ne.	1-4	5	0.18
8	30.08	30.02	30.07	72	81	74	83	70	80	63	77	ne.	2-4	7	0.65
9	30.11	30.06	30.11	73	80	76	84	71	77	61	68	ne.	3	6	0.03
10	30.14	30.06	30.12	73	80	75	83	71	73	72	72	ne.	3	5	0.07
11	30.13	30.04	30.10	74	80	76	83	71	75	61	68	ne.	4	5	0.25
12	30.09	30.03	30.07	74	80	76	83	73	71	61	74	ne.	4	3-8	0.15
13	30.06	29.97	30.08	72	80	75	84	71	89	66	74	ene.	1-4	3	0.00
14	30.08	29.99	30.04	69	81	75	85	68	79	59	72	*	0-3	1-7	0.00
15	30.07	29.98	30.06	71	81	74	84	69	74	58	75	s.	0-2	2	0.00
16	30.07	30.00	30.05	69	81	74	84	68	81	63	72	s.	0-3	2	0.00
17	30.05	29.99	30.04	72	78	74	82	72	93	75	80	†	2-0	10-4	0.25
18	30.08	30.00	30.09	71	83	74	84	70	88	62	82	ne.	0-2	1	0.00
19	30.11	30.02	30.08	72	82	72	85	68	82	58	78	nne.	0-3	2	0.00
20	30.07	30.00	30.04	71	82	73	85	70	84	65	81	s-wsw.	0-3	2	0.00
21	30.07	29.99	30.07	71	81	77	85	71	92	59	69	nne.	1-4	7	0.14
22	30.11	30.03	30.09	72	81	72	83	70	84	64	86	ne.	3	5	0.07
23	30.15	30.07	30.11	73	80	76	84	72	73	67	66	ne.	3	7	0.22
24	30.10	30.00	30.05	72	79	73	81	70	80	62	84	ne.	2-5	7	0.35
25	30.05	29.99	30.00	74	80	76	81	72	71	62	75	ne.	5	3	0.17
26	30.05	29.97	30.01	74	81	76	83	73	70	55	67	ne.	4	3	0.02
27	30.05	29.98	30.02	74	82	76	84	72	72	60	74	ne.	3	7	0.09
28	30.05	29.98	30.03	74	80	76	84	72	73	64	70	ne.	4	8	0.08
29	30.07	30.01	30.08	76	81	75	83	73	68	61	74	ne.	4	8	0.05
30	30.10	30.03	30.07	76	81	76	83	74	74	59	70	ene.	3-4	7	0.03
31	30.09	30.02	30.05	75	81	76	83	74	66	56	70	ene.	3-4	7	0.04
	30.08	30.00	30.06	72.6	80.7	74.8	83.5	71.0	78.2	62.3	74.4		2.8	5.0	3.57

Mean temperature: 6+2+9+8 is 76.0; the normal is 76.3; extreme temperatures, 85° and 68°. *nw-c-ese. †wnw-nne-c.

TABLE V.—*Mean temperature for each hour of seventy-fifth meridian time, October, 1896.*

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Bismarck, N Dak.....	37.4	36.4	36.2	35.4	34.5	33.6	32.7	31.8	32.2	35.4	40.2	44.6	47.9	50.4	52.2	53.0	53.5	52.3	49.7	45.6	42.0	39.9	38.2	37.4	41.4
Boston, Mass.	47.7	47.3	47.0	46.5	46.3	46.3	46.7	48.1	49.6	51.3	52.6	53.7	54.8	55.4	55.1	54.7	53.7	52.9	52.1	51.2	50.2	49.7	49.1	48.3	50.4
Buffalo N Y.....	45.3	44.9	44.8	44.3	44.2	44.4	44.8	45.3	46.4	47.5	48.7	49.8	50.6	50.9	51.4	51.1	50.5	49.3	48.2	48.4	47.5	46.8	45.9	45.4	47.4
Chicago, Ill.....	49.5	48.9	48.2	47.3	46.8	46.1	45.5	45.1	46.4	48.2	49.6	50.6	51.1	52.1	52.5	52.8	53.0	52.8	52.1	51.5	51.1	50.6	50.2	49.6	49.7
Cincinnati, Ohio.....	50.0	48.9	47.9	47.0	46.1	45.3	44.8	46.3	48.4	51.2	54.6	57.2	58.9	60.3	61.2	61.5	61.2	60.1	58.3	56.9	55.1	54.0	52.7	51.4	53.3
Cleveland, Ohio	46.8	46.2	45.8	45.1	44.5	44.1	43.5	44.1	45.5	48.0	50.4	51.8	52.7	53.5	54.0	53.8	53.6	53.0	51.6	50.4	49.1	48.2	47.7	47.0	48.8
Detroit, Mich.....	44.8	43.8	43.5	42.8	42.5	42.4	41.9	43.0	44.9	46.7	48.6	50.5	51.9	53.4	53.7	53.7	53.2	51.9	50.1	48.9	48.1	47.4	46.4	45.5	47.5
Dodge City, Kans.....	48.5	47.5	46.4	45.4	44.6	43.9	43.2	42.5	43.5	49.0	54.7	59.0	61.7	63.6	65.3	66.0	66.1	64.8	62.0	57.1	54.5	52.7	50.8	49.6	53.4
Eastport, Me.....	45.1	44.8	44.5	44.1	43.8	43.9	44.3	45.0	45.8	47.0	47.8	48.9	49.4	49.6	49.3	48.9	48.0	47.4	46.8	46.5	45.9	45.6	45.4	45.2	46.4
Galveston, Tex.....	70.9	70.5	70.0	69.7	69.4	69.1	68.8	68.9	68.6	69.1	69.9	71.2	71.9	72.7	73.7	74.2	74.5	74.0	73.5	72.8	72.3	71.6	71.3	70.9	71.2
Havre, Mont.....	40.6	39.5	37.9	36.8	35.5	34.9	34.0	32.9	32.1	33.4	37.7	42.8	47.6	51.5	54.5	56.1	57.3	57.4	55.4	50.6	46.5	44.3	42.5	41.1	43.5
Kansas City, Mo.....	52.4	51.1	50.1	49.1	48.1	47.5	47.3	47.0	48.6	51.3	54.5	57.8	60.1	62.3	63.8	64.5	64.2	63.3	61.1	59.2	56.8	55.3	54.1	53.0	55.1
Key West, Fla.....	78.8	78.6	78.4	78.3	78.2	78.1	78.1	79.0	79.7	80.4	81.1	81.7	81.5	81.6	81.4	81.0	80.6	80.0	79.7	79.4	79.1	79.0	78.8	78.7	79.6
Memphis, Tenn.....	59.0	58.1	57.1	56.3	55.7	55.1	54.5	54.3	55.0	58.0	61.7	65.0	67.5	68.6	70.0	70.8	70.5	69.3	67.3	65.6	63.7	62.1	61.0	59.8	61.9
New Orleans, La.....	67.3	66.7	66.8	66.5	66.0	65.6	65.4	64.9	66.3	68.6	71.1	73.1	74.1	74.8	75.5	75.7	75.4	74.6	72.7	71.1	70.2	69.4	68.6	67.7	69.9
New York, N. Y.....	49.6	49.1	48.6	48.5	48.4	48.4	48.3	49.1	50.5	51.6	53.2	54.5	55.3	55.6	56.4	56.2	55.5	54.1	52.9	52.4	51.5	51.0	50.4	50.1	51.7
Philadelphia, Pa.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pittsburg, Pa.....	47.6	46.4	45.6	45.0	44.4	44.0	43.6	45.0	46.2	48.6	52.1	54.6	56.3	57.3	58.0	57.7	57.5	56.2	54.6	52.6	51.5	50.2	49.3	47.9	50.5
Portland, Oreg.....	55.3	53.7	52.4	51.7	51.2	50.3	49.3	49.5	48.1	47.8	48.9	51.1	53.7	56.1	59.0	60.9	62.3	63.2	62.8	61.5	59.8	58.5	57.1	55.9	55.0
St. Louis, Mo.....	54.5	53.4	52.3	51.4	50.3	49.7	49.1	48.9	50.4	53.0	56.6	59.5	61.7	63.2	64.1	64.7	64.7	63.5	61.7	60.1	58.6	57.2	56.0	55.2	56.7
St. Paul, Minn.....	43.2	42.6	41.8	41.0	40.3	39.9	39.1	38.6	39.4	41.5	45.2	47.6	49.8	51.2	52.2	52.5	52.5	51.7	49.9	48.2	46.5	45.3	43.9	43.3	45.3
Salt Lake City, Utah..	50.9	49.8	49.0	49.0	48.6	48.7	48.4	47.3	46.4	49.0	52.4	56.5	60.3	62.1	62.9	63.9	64.5	64.3	63.3	60.6	57.4	55.9	53.3	51.4	54.8
San Diego, Cal.....	61.6	61.3	60.8	60.7	60.3	60.2	59.8	59.7	59.3	59.5	62.0	64.6	66.6	67.6	68.6	69.0	68.9	68.6	67.9	66.5	65.0	64.2	63.1	62.4	63.7
San Francisco, Cal....	55.8	55.5	55.1	54.8	54.6	54.4	54.0	54.2	53.5	53.6	54.8	57.0	59.5	61.2	62.5	63.8	63.4	62.9	60.9	59.2	57.9	57.2	56.3	56.3	57.4
Savannah, Ga.....	62.4	61.7	60.6	59.8	59.2	58.9	59.2	61.5	65.2	68.9	71.8	73.5	74.8	75.2	74.8	74.0	72.3	69.9	68.2	67.1	66.2	65.3	64.5	63.5	66.6
Washington, D. C....	49.8	49.2	48.7	48.1	47.8	47.6	47.9	49.9	53.0	55.3	57.8	59.4	61.0	62.0	62.3	61.8	60.7	58.5	55.7	54.3	52.7	51.8	50.9	50.2	54.0

TABLE VI.—*Mean pressure for each hour of seventy-fifth meridian time, October, 1896.*

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Bismarck, N. Dak...	28.276	.273	.273	.271	.269	.270	.272	.275	.280	.283	.280	.277	.268	.256	.243	.236	.235	.237	.244	.253	.258	.264	.269	.271	.264
Boston, Mass.....	29.893	.886	.884	.887	.889	.895	.907	.911	.913	.909	.902	.885	.872	.869	.865	.868	.875	.883	.890	.898	.908	.903	.900	.896	.891
Buffalo, N. Y.....	29.205	.202	.200	.202	.208	.217	.225	.235	.242	.243	.242	.235	.223	.215	.210	.209	.210	.214	.219	.223	.224	.222	.217	.214	.219
Chicago, Ill.....	29.165	.164	.165	.166	.169	.177	.182	.194	.200	.201	.200	.195	.182	.167	.157	.157	.154	.156	.157	.159	.161	.162	.164	.161	.172
Cincinnati, Ohio ...	29.403	.406	.405	.406	.412	.421	.431	.443	.452	.449	.444	.433	.415	.395	.386	.380	.378	.381	.387	.391	.400	.403	.406	.408	.410
Cleveland, Ohio	29.221	.221	.224	.225	.231	.239	.248	.257	.264	.265	.261	.251	.238	.226	.220	.216	.216	.218	.221	.226	.230	.229	.225	.225	.233
Detroit, Mich.....	29.263	.263	.263	.265	.268	.275	.282	.290	.297	.299	.299	.291	.276	.263	.255	.252	.254	.257	.263	.265	.269	.268	.267	.263	.271
Dodge City, Kans..	27.448	.448	.452	.450	.447	.448	.452	.453	.459	.462	.462	.454	.443	.423	.399	.387	.383	.383	.389	.405	.415	.426	.437	.440	.432
Eastport, Me.....	29.910	.905	.905	.908	.911	.918	.929	.937	.943	.942	.935	.926	.920	.916	.916	.916	.920	.924	.926	.929	.930	.926	.922	.921	.922
Galveston, Tex.....	30.019	.018	.016	.009	.006	.007	.015	.026	.039	.051	.055	.051	.037	.012	.995	.986	.984	.984	.988	.999	.008	.016	.019	.018	.015
Havre, Mont.....	27.378	.382	.384	.383	.384	.386	.391	.396	.403	.412	.416	.413	.409	.392	.375	.365	.358	.353	.350	.353	.357	.378	.365	.367	.380
Kansas City, Mo....	29.037	.041	.041	.040	.041	.046	.052	.060	.073	.079	.079	.074	.056	.033	.017	.006	.000	.001	.002	.010	.017	.025	.027	.028	.037
Key West, Fla.....	29.977	.968	.957	.954	.957	.967	.981	.994	.005	.008	.006	.995	.977	.958	.951	.946	.949	.957	.965	.979	.989	.993	.990	.982	.975
Memphis, Tenn.....	29.650	.648	.647	.646	.648	.653	.661	.673	.690	.695	.695	.692	.673	.649	.629	.622	.616	.620	.624	.630	.636	.644	.649	.648	.652
New Orleans, La...	29.992	.991	.988	.986	.990	.997	.004	.012	.028	.037	.038	.029	.008	.985	.970	.959	.956	.960	.966	.969	.981	.988	.994	.991	.993
New York, N. Y....	29.697	.692	.690	.691	.693	.698	.706	.715	.716	.715	.709	.697	.685	.679	.676	.679	.682	.690	.696	.705	.713	.714	.710	.707	.698
Philadelphia, Pa....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pittsburg, Pa.....	29.166	.167	.168	.171	.176	.185	.198	.206	.210	.209	.207	.199	.184	.171	.166	.162	.164	.167	.171	.171	.174	.174	.173	.172	.180
Portland, Oreg.....	29.852	.854	.857	.863	.863	.863	.865	.869	.875	.878	.886	.889	.884	.881	.863	.852	.838	.831	.824	.824	.827	.831	.837	.844	.856
St. Louis, Mo.....	29.454	.455	.455	.455	.461	.469	.478	.488	.495	.497	.493	.485	.470	.451	.439	.431	.425	.425	.431	.435	.442	.448	.451	.450	.458
St. Paul, Minn.....	29.103	.100	.111	.112	.112	.114	.118	.118	.126	.129	.127	.123	.110	.093	.080	.070	.067	.070	.074	.079	.082	.084	.086	.087	.099
Salt Lake City, Utah	25.665	.666	.670	.671	.670	.669	.675	.677	.685	.693	.699	.697	.689	.677	.660	.647	.640	.634	.630	.628	.634	.640	.644	.651	.663
San Diego, Cal.....	29.873	.871	.871	.871	.865	.859	.861	.868	.874	.885	.897	.901	.902	.895	.879	.862	.849	.842	.840	.842	.846	.854	.864	.868	.868
San Francisco Cal..	29.828	.833	.832	.833	.829	.822	.825	.828	.835	.845	.860	.867	.867	.863	.846	.831	.818	.805	.798	.795	.801	.809	.816	.825	.829
Savannah, Ga.....	29.946	.946	.942	.942	.949	.959	.973	.985	.995	.996	.991	.979	.954	.933	.921	.912	.909	.914	.923	.929	.937	.946	.947	.945	.949
Washington, D. C...	29.944	.941	.938	.940	.945	.953	.965	.976	.983	.982	.976	.964	.943	.930	.924	.922	.924	.928	.938	.945	.951	.955	.954	.950	.949

TABLE VII.—*Average wind movement for each hour of seventy-fifth meridian time, October, 1896.*

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Abilene, Tex.	6.0	6.5	6.0	5.6	6.0	5.5	5.5	5.8	6.1	7.8	9.0	9.6	9.7	10.1	10.2	10.1	10.3	9.5	8.1	6.6	5.9	5.6	5.6	5.5	7.4
Albany, N. Y.	5.3	5.1	5.3	5.6	6.2	6.3	6.3	6.8	7.9	8.8	9.3	9.4	10.0	9.7	9.7	9.1	8.4	7.3	6.6	7.1	6.5	5.9	5.9	5.8	7.3
Alpena, Mich.	8.0	7.8	7.2	7.4	7.9	7.8	7.1	7.5	8.5	9.3	10.9	11.2	11.6	12.2	11.9	11.5	10.7	9.7	8.5	8.5	8.1	7.9	7.6	7.9	9.0
Amarillo, Tex.	11.9	12.2	12.7	13.5	13.5	13.7	13.2	13.1	12.3	12.3	13.8	14.4	14.2	13.9	13.7	13.2	12.9	12.9	12.7	11.4	12.1	11.6	11.8	11.9	12.9
Atlanta, Ga.	9.5	9.2	9.8	10.0	9.7	9.9	9.8	9.1	9.4	9.8	10.9	10.9	11.0	10.8	10.8	10.8	10.3	8.3	7.1	7.9	8.3	8.8	9.3	8.8	9.6
Augusta, Ga.	4.1	4.0	4.6	4.6	4.5	4.2	4.5	4.9	5.6	5.9	6.6	7.2	7.5	7.6	7.8	7.7	6.8	6.0	5.2	4.4	4.3	4.0	4.2	3.9	5.4
Baker City, Oreg.	6.2	7.1	7.5	7.3	8.1	7.9	7.8	8.3	7.4	6.8	6.5	6.2	3.0	3.4	4.0	4.6	5.8	7.0	6.5	4.8	3.0	3.6	5.1	5.5	5.9
Baltimore, Md.	4.0	4.2	4.0	4.1	4.1	4.1	3.8	4.1	4.9	5.4	5.7	6.2	6.7	6.7	6.4	6.3	5.7	4.8	4.1	4.2	4.1	4.0	4.1	3.7	4.8
Bismarck, N. Dak.	6.2	6.6	6.9	6.6	7.2	7.5	7.3	6.9	6.6	6.7	7.9	9.0	10.4	11.3	11.5	12.4	12.5	11.9	9.5	7.8	7.0	6.3	5.5	5.5	8.2
Block Island, R. I.	20.0	20.0	21.1	21.1	20.4	20.7	20.0	21.0	21.5	21.4	21.5	21.5	21.9	21.7	22.2	22.6	22.0	22.0	21.3	20.8	19.9	20.6	21.0	20.7	21.1
Boston, Mass.	10.9	10.7	10.6	10.9	10.6	10.4	10.8	11.3	12.5	13.4	13.1	12.9	13.3	13.4	13.2	12.8	12.0	10.9	10.8	10.6	10.7	10.4	10.6	10.7	11.6
Buffalo, N. Y.	11.3	12.4	12.8	12.8	13.2	13.0	12.8	13.4	14.0	14.0	14.9	15.2	16.3	16.2	16.6	15.6	14.5	13.5	12.4	12.0	12.2	11.7	12.3	12.6	13.6
Cairo, Ill.	5.9	5.7	5.9	5.5	5.7	5.8	5.9	6.0	5.9	7.3	7.5	8.5	9.7	10.1	10.0	10.1	9.6	8.3	6.9	6.4	6.4	6.1	5.6	5.6	7.1
Cape Henry, Va.	17.4	17.5	17.0	16.7	15.7	16.3	16.7	16.1	16.9	17.5	17.7	16.4	17.0	16.6	16.3	15.8	15.0	14.5	14.8	16.0	16.5	17.2	17.5	16.8	16.5
Charleston, S. C.	7.5	7.4	7.3	7.1	7.7	7.7	8.1	8.2	8.5	8.6	9.1	9.5	10.1	10.6	10.6	10.2	9.9	8.5	7.5	6.9	6.8	6.7	7.4	7.5	8.3
Charlotte, N. C.	6.0	5.5	5.6	5.4	5.2	5.3	5.0	5.4	6.2	7.0	7.3	7.5	7.9	8.8	8.5	8.9	8.5	7.8	6.6	5.7	5.5	5.6	5.6	6.2	6.2
Chattanooga, Tenn.	5.1	5.1	4.9	5.2	5.0	4.9	4.8	5.1	5.5	6.6	6.9	8.0	8.2	8.3	8.8	8.6	7.8	6.6	5.7	4.9	4.8	4.6	5.0	4.9	6.3
Cheyenne, Wyo.	6.7	6.9	7.2	7.2	7.2	6.7	7.0	7.5	7.5	7.7	9.6	11.5	12.4	13.0	12.6	12.6	12.5	11.4	10.5	8.1	7.3	6.5	6.5	7.1	8.9
Chicago, Ill.	16.7	16.9	17.0	17.6	16.5	16.1	16.1	16.3	16.0	16.2	16.4	16.4	17.0	17.6	17.9	17.8	17.0	16.1	15.5	15.7	15.8	16.5	16.0	16.1	16.5
Cincinnati, Ohio.	5.3	5.2	5.2	4.9	5.2	5.1	5.0	5.3	6.1	7.2	7.7	7.6	10.1	10.6	10.6	10.2	9.9	8.5	8.6	6.7	6.6	6.8	6.7	6.0	6.5
Cleveland, Ohio	14.1	14.3	14.2	13.6	13.6	13.6	13.7	13.8	13.4	13.0	13.3	13.5	14.8	14.8	14.8	14.3	14.1	12.5	11.4	12.3	12.4	12.4	12.1	13.0	13.1	13.4
Columbia, Mo.	7.2	6.9	6.9	6.9	7.5	7.0	7.0	7.2	7.0	7.4	7.1	7.6	10.2	10.5	10.8	10.5	9.7	8.1	7.1	6.7	6.7	7.4	7.5	7.6	7.6	8.0
Columbus, Ohio	6.0	5.7	5.5	5.5	5.8	5.4	5.6	6.3	6.6	7.1	7.6	7.8	8.9	9.0	9.2	9.4	8.1	7.1	7.4	7.2	7.0	6.4	6.2	6.0	5.8	6.8
Concordia, Kans.	4.8	5.5	5.0	4.7	4.5	4.9	4.8	4.8	4.7	5.6	6.2	6.6	8.2	8.1	8.7	8.5	8.2	11.7	5.6	12.1	4.5	4.9	5.3	5.4	5.2	6.0
Corpus Christi, Tex.	10.1	9.4	9.4	9.2	8.8	8.2	8.4	9.3	9.1	9.6	10.1	10.8	9.3	9.8	10.8	10.4	11.4	11.5	11.7	11.2	11.0	10.8	10.7	10.7	10.1
Davenport, Iowa.	7.3	7.9	7.7	7.2	7.3	7.5	8.1	7.7	8.6	9.3	10.2	10.6	11.7	11.7	11.9	11.7	11.4	9.7	8.0	7.6	7.1	6.3	6.6	6.9	8.7
Denver, Colo.	6.7	6.8	7.2	6.9	6.4	5.7	5.9	6.4	6.2	5.5	6.4	5.5	5.7	6.2	7.2	7.5	7.4	7.2	7.4	7.5	7.1	7.2	7.5	7.0	6.7
Des Moines, Iowa.	6.7	6.5	6.1	6.1	6.1	5.5	5.4	5.4	5.6	7.1	9.0	9.2	9.8	10.2	10.1	10.2	10.1	8.8	8.0	7.9	7.3	6.9	7.3	7.1	7.5
Detroit, Mich.	7.8	7.9	8.0	8.0	7.9	7.9	8.0	7.9	9.5	10.3	10.8	10.9	11.0	11.1	11.3	11.4	10.8	10.4	9.7	9.4	8.5	8.2	8.7	8.5	9.1
Dodge City, Kans.	8.2	7.4	7.4	7.6	8.0	7.5	7.9	7.7	7.7	9.1	11.5	12.2	12.5	12.8	12.9	12.9	12.4	11.5	10.4	9.6	9.6	9.4	9.5	9.1	9.8
Dubuque, Iowa.	3.0	2.7	2.8	2.9	3.0	3.1	2.8	2.8	3.6	4.4	4.7	5.8	6.2	6.2	6.4	6.4	6.2	4.8	3.4	3.3	3.4	3.2	2.9	2.8	4.0
Duluth, Minn.	11.4	11.5	11.9	11.8	11.3	10.7	10.1	10.4	9.1	8.5	9.8	11.1	11.4	10.9	10.2	11.1	10.8	10.6	9.2	8.6	8.8	9.0	10.8	11.1	10.4
Eastport, Me.	12.1	11.9	11.7	11.0	11.5	11.6	11.9	12.6	13.0	13.6	13.2	12.9	12.2	12.7	12.7	12.1	10.5	10.4	11.7	11.9	12.2	12.1	12.7	12.6	12.2	12.4
El Paso, Tex.	9.3	9.8	9.9	9.7	9.3	8.8	8.9	8.8	6.5	7.0	7.5	8.8	9.6	9.8	11.2	10.6	10.2	9.3	8.0	9.8	9.6	8.6	9.4	9.2	8.3	9.1
Erie, Pa.	9.9	10.2	9.4	8.9	9.0	8.9	8.8	8.4	9.6	9.8	10.2	10.2	10.2	10.5	11.2	10.6	10.2	9.3	7.5	7.5	7.7	7.9	8.5	9.4	9.7	9.4
Eureka, Cal.	3.8	3.1	3.2	3.2	3.1	3.2	3.3	3.2	3.2	2.5	3.0	2.7	2.8	4.0	4.8	6.4	7.5	8.2	8.8	8.6	7.5	6.0	4.4	3.8	4.2	4.6
Fort Canby, Wash.	8.2	8.9	8.5	9.0	9.5	9.2	9.2	10.0	9.3	9.4	9.4	9.4	9.6	9.5	10.1	10.7	10.7	10.4	8.3	10.2	10.4	8.9	8.5	7.9	7.8	9.4
Fort Smith, Ark.	4.6	4.8	4.7	4.8	4.5	4.6	4.5	4.3	3.7	3.7	3.8	3.9	4.0	5.0	7.6	8.2	8.5	8.9	3.8	4.2	5.7	5.5	5.2	5.3	5.1	6.0
Fresno, Cal.	5.9	5.5	4.6	4.0	3.9	4.0	4.0	3.7	3.7	4.7	6.2	6.9	6.6	7.3	4.4	4.3	3.9	3.7	7.4	4.2	4.1	4.3	4.5	5.2	5.8	4.3
Galveston, Tex.	8.9	8.8	9.1	8.6	9.4	9.4	10.0	10.2	10.2	10.5	11.1	10.5	10.0	10.3	9.9	9.6	8.5	7.9	7.4	7.0	6.8	7.9	8.3	8.7	8.8	9.1
Grand Haven, Mich.	9.2	9.1	8.7	8.7	8.4	8.2	8.3	7.8	8.1	9.3	10.9	11.0	11.3	12.5	12.6	12.8	11.6	9.9	8.0	8.4	8.9	9.1	9.1	9.6
Greenbay, Wis.	6.8	6.3	6.6	6.5	6.7	6.2	6.4	6.1	7.1	8.0	9.2	9.0	10.6	11.3	9.7	9.5	9.4	7.6	6.7	6.9	6.9	6.5	6.7	6.8	7.5
Hannibal, Mo.	6.7	6.9	6.8	7.3	7.5	7.1	7.1	7.0	7.1	8.1	9.2	8.3	9.3	9.5	12.0	12.2	11.9	8.9	7.4	6.5	6.5	6.3	6.7	6.5	6.8	8.3
Harrisburg, Pa.	5.6	4.9	4.8	5.1	5.5	5.6	5.7	6.0	6.9	7.4	8.2	8.3	15.3	15.6	9.5	9.5	11.9	8.3	5.4	5.0	4.9	5.0	5.2	4.8	6.5	6.6
Hatteras, N. C.	14.2	14.3	14.9	15.5	15.4	15.4	15.3	15.0	15.2	15.5	15.0	14.9	15.3	15.6	15.8	15.2	14.2	13.8	13.6	13.3	13.0	13.0	13.2	13.5	13.2	14.6
Havre, Mont.	5.6	6.3	5.5	5.7	5.5	5.5	5.0	4.8	4.5	4.8	5.7	6.5	6.7	7.0	7.9	8.0	7.6	6.6	4.5	4.2	4.4	4.5	5.8
Helena, Mont.	7.3	6.9	7.0	7.0	7.0	6.0	5.3	5.5	4.7	3.9	3.8	4.0	5.0	5.2	5.2	5.2	6.7	6.2	6.7	8.4	8.4	8.4	8.4	8.6	7.9	6.2
Huron, S. Dak.	10.7	10.5	10.4	10.4	10.5	11.1	10.5	10.9	11.2	11.8	13.5	13.7	13.7	14.2	13.6	14.0	13.8	13.8	10.2	10.8	10.7	10.2	9.5	9.5	11.6
Idaho Falls, Idaho	5.4	5.5	5.6	5.3	4.9	4.9	5.3	5.6	7.0	8.4	9.1	5.5	10.6	11.1	6.0	11.2	14.0	13.8	7.5	7.3	5.9	5.9	6.4	6.5	6.0	8.7
Indianapolis, Ind.	7.6	6.8	6.7	6.6	7.0	6.5	6.6	6.5	7.0	8.4	5.7	6.8	9.8	11.2	11.8	11.6	10.3	9.1	7.9	5.4	5.6	5.9	6.4	6.5	6.9	9.4
Jacksonville, Fla.	5.5	5.4	5.6	6.0	5.7	5.9	5.5	5.8	5.5	6.9	8.0	8.4	9.0	8.6	8.9	9.0	9.0	7.5	7.0	5.9	5.6	5.2	4.2	4.6	4.8	5.4
Jupiter, Fla.	7.5	8.1	7.7	7.5	7.7	7.6	7.6	8.3	8.7	9.1	10.1	10.9	11.0	9.1	9.6	9.8	10.6	10.6	10.0	8.1	7.4	6.9	6.3	6.6	6.9	7.9
Kansas City, Mo.	7.8	7.5	7.5	7.3	6.8	6.7	6.4	6.5	7.6	8.3	7.5	9.2	8.3	9.5	9.5	9.8	9.2	9.1	8.5	6.9	7.1	7.3	7.3	7.5	7.6	8.6
Keokuk, Iowa.	7.0	6.9	7.3	7.0	6.7	6.4	6.5	6.4	7.6	7.2	7.5	8.3	8.5	9.5	9.6	9.4	9.7	9.1	8.9	7.2	6.9	5.3	5.6	5.4	5.6	6.2
Key West, Fla.	8.8	9.4	9.2	9.4	9.5	9.4	8.7	9.5	10.6	10.9	11.4	10.5	10.5	9.5	9.5	9.9	9.7	9.1	8.5	7.8	8.4	7.9	8.6	8.6	8.4	8.6
Kittyhawk, N. C.	16.9	17.2	16.8	16.8	16.2	15.7	16.5	16.7	17.6	17.6	18.4	18.3	18.4	18.3	17.7	17.7	17.1	17.7	16.9	16.0	15.5	15.8	15.7	15.5	16.7	16.9
Knoxville, Tenn.	3.9	3.1	2.7	2.8	3.2	3.3	3.1	3.4	4.6	5.1	5.4	6.0	6.8	6.1	6.9	8.6	8.9	6.0	5.8	4.4	4.9	3.0	2.8	3.0	3.1	4.3
La Crosse, Wis.	5.6	5.3	5.1	5.2	5.6	5.5	5.5	5.5	5.0	6.4	6.7	6.8	8.5	8.5	8.6	8.9	9.2	6.4	4.9	7.1	7.3	6.9	6.9	6.2	6.0	5.2
Lander, Wyo.	1.6	1.8	1.5	1.5	1.8	1.4	1.3	1.4	1.5	1.5	0.6	2.7	3.0	3.0	3.0	3.5	6.1	11.4	11.5	3.4	3.0	4.6	10.9	10.5	10.7	2.5
Lexington, Ky.	10.6	10.0	10.2	10.7	10.7	10.2	10.5	9.7	9.5	10.4	10.5	10.5	10.5	10.9	11.0	11.0	11.0	10.1	9.9	10.4	10.4	10.7	10.9	10.5	10.7	10.5
Little Rock, Ark.	5.3	5.3	5.5	5.4	5.0	5.1	5.1	5.3	6.1	7.2	7.5	8.0	7.9	8.4	9.0	8.6	8.9	8.0	8.5	7.6	5.9	4.8	5.0	4.9	5.1	5.1
Los Angeles, Cal.	2.3	2.1	2.3	1.6	1.8	2.0	2.3	2.0	2.3	2.1	2.5	3.2	3.2	3.5	4.2	5.2	5.9	7.4	9.1	8.2	7.7	6.6	5.1	3.0	2.2	2.1
Louisville, Ky.	5.0	5.3	5.0	4.9	4.7	4.7	4.3	4.6	5.6	6.5	6.9	7.0	7.7	7.7	8.5	9.1	9.3	9.1	8.0	8.2	7.7	7.2	7.2	5.8	5.4	5.4
Lynchburg, Va.	2.1	2.3	2.0	1.9	2.0	2.1	2.2	2.4	3.6	4.9	5.6	6.1	6.5	6.6	6.6	6.7	6.1	5.5	4.5	3.7	3.0	3.2	3.0	3.0	2.6	3.8
Marquette, Mich.	10.7	10.1	9.8	9.6	9.4	9.2	9.5	9.5	9.4	10.0	11.1	11.5	11.7	12.0	11.1	11.4	10.4	10.3	9.6	9.3	8.7	8.3	8.6	9.2	10.0	9.9
Memphis, Tenn.	8.0	7.7	8.2	8.0	7.6	7.7	7.2	7.1	7.5	7.7	8.1	8.4	9.1	9.8	8.4	8.4	7.9	7.3	7.5	7.9	8.4	8.1	8.2
Miles City, Mont.	4.1	3.5	3.8	3.9	3.5	3.5	3.5	3.4	3.6	4.3	6.0	10.5	10.8	11.3	8.2	8.9	8.9	8.5	6.5	5.1	4.2	4.5	4.3	5.4
Milwaukee, Wis.	8.3	8.2	8.2	8.6	8.5	8.5	8.9	8.4	8.5	9.1	10.5	7.5	7.5	8.6	8.3	8.0	8.0	8.0	7.7	6.5	5.6	5.4	8.5	8.6	8.5	9.4
Mobile, Ala.	5.2	5.1	5.4	5.4	5.4	5.6	5.3	6.1	6.4	7.3	7.4	7.8	7.8	7.7	8.8	8.5	8.6	8.9	8.5	6.6	5.4	5.4	5.4	5.5	5.5	6.5
Montgomery, Ala.	4.2	3.9	3.6	4.3	4.2	3.7	4.3	4.1	5.0	6.4	7.2	7.4	7.5	7.5	7.8	7.7	8.0	7.7	6.6	5.3	5.1	5.3	4.8	4.5	4.3	5.6
Moorhead, Minn.	9.0	9.2	9.8	9.7	9.5	9.3	9.4	10.0	10.2	10.6	11.6	12.0	12.0	12.1	12.6	13.0	12.6	12.4	10.8	9.7	9.8	9.5	9.2	9.3	9.6	10.5
Nantucket, Mass.	14.8	14.1	14.6	14.9	14.5	14.1	13.7	14.4	15.2	15.5	15.1	14.7	15.5	15.9	16.0	15.5	14.4	14.4	14.4	14.9	15.2	15.1	14.7	15.0	15.1	14.9
Nashville, Tenn.	5.3	4.9	4.5	4.2	3.9	3.5	3.9	4.1	5.3	6.5	7.3	7.8	8.2	8.7	8.5	8.7	9.2	8.8	8.9	7.4	8.6	6.5	5.1	5.4	5.4	6.2
New Haven, Conn.	8.5	8.8	9.1	9.0	8.7	8.9	8.9	9.4	10.6	11.7	12.2	12.1	12.1	12.4	12.0	12.5	10.4	8.9	8.5	6.5	6.5	8.8	5.9	7.5	8.5	7.5
New Orleans, La.	6.2	6.7	7.1	7.2	7.3	7.4	7.5	8.1	8.7	9.1	9.6	9.9	9.7	10.0	9.7	9.8	9.5	9.1	8.9	6.8	6.5	5.9	6.2	6.4	6.5	6.4
New York, N. Y.	12.8	12.6	12.0	11.8	12.6	12.8	13.5	13.3	14.2	14.3	14.6	15.2	15.1	15.7	16.2	16.7	16.0	15.0	15.4	15.7	14.8	13.7	13.0	12.8	14.2
Norfolk, Va.	7.7	7.7	7.6	7.6	8.0	7.9	8.0	7.7	8.8	9.5	9.8	9.9	10.5	10.3	9.4	9.1	8.5	8.1	7.8	7.5	7.8	7.5	8.1	8.1	8.4
Northfield, Vt.	5.6	5.9	6.0	5.2	5.8	6.1	5.4	6.1	6.6	6.3	7.8	8.9	11.4	12.1	11.5	10.4	9.1	7.7	6.6	6.4	6.1	6.4	6.1	5.3	5.3	7.4
North Platte, Nebr.	7.8	7.5	7.5	7.1	6.5	6.4	5.6	5.5	5.9	6.3	8.1	9.1	9.6	10.3	9.4	12.0	12.3	12.2	8.9	11.3	8.6	8.5	5.8	9.2	8.5	8.6
Oklahoma, Okla.	5.0	5.2	5.5	6.0	5.8	5.7	6.1	6.0	6.6	8.1	9.1	9.6	9.4	9.3	9.1	9.5	9.1	9.1	10.3	8.3	9.6	9.6	8.8	5.5	5.6	7.0
Omaha, Nebr.	6.7	6.5	6.3	6.5	6.2	6.2	5.6	5.6	6.1	7.2	8.0	7.8	8.2	8.7	9.0	9.3	8.7	8.1	6.5	6.5	6.8	7.2	7.7	7.0	7.2
Oswego, N. Y.	8.2	8.6	9.0	9.6	9.3	9.1	9.2	9.8	9.7	10.4	10.6	10.3	10.7	11.4	11.3	10.4	9.2	8.7	8.6	8.7	9.3	9.4	9.3	9.3	9.6
Palestine, Tex.	4.1	4.3	4.0	3.9	3.5	3.4	3.3	3.4	4.1	4.5	5.5	5.6	6.4	6.7	6.4	6.7	6.3	5.8	5.2	4.4	4.5	4.2	4.4	4.2	4.5
Parkersburg, W. Va.	3.4	3.7	3.5	3.8	3.9	3.6	3.4	3.6	4.1	4.8	5.8	6.4	6.5	6.4	6.7	6.4	6.5	6.6	5.9	4.9	4.0	4.2	4.4	4.4	3.8	3.5
Pensacola, Fla.	8.3	8.2	8.7	8.8	9.1	8.9	9.8	9.2	10.2	10.0	9.5	10.1	10.2	10.5	10.3	10.5	10.3	9.5	8.2	7.4	7.5	7.9	8.0	8.4	9.1

TABLE VII.—*Average wind movement, etc.*—Continued.

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Philadelphia, Pa.	9.1	8.9	9.1	8.9	8.8	8.7	8.8	10.4	11.3	12.1	12.6	12.5	12.4	12.5	12.2	12.1	11.4	9.7	8.9	9.4	9.4	8.9	8.8	8.7	10.2
Phœnix, Ariz	3.9	4.1	4.0	3.9	3.5	3.4	3.5	4.0	4.1	4.3	4.7	5.7	6.5	5.6	5.3	5.3	5.2	5.6	4.7	3.8	2.5	3.1	2.8	3.6	4.3
Pierre, S. Dak.	5.9	5.6	5.4	4.5	5.0	5.6	5.7	6.4	6.2	7.0	7.5	8.2	10.0	11.0	11.2	11.0	10.8	10.3	8.7	7.6	7.5	6.9	6.6	6.0	7.5
Pittsburg, Pa.	4.2	4.5	4.6	3.9	4.0	3.9	4.0	4.7	5.4	5.9	6.7	7.2	7.5	7.4	6.8	7.0	6.6	6.2	5.2	5.3	5.4	5.0	4.6	4.5	5.4
Port Angeles, Wash.	4.5	5.2	5.2	5.4	5.3	5.3	4.6	4.9	4.9	4.7	4.2	2.7	3.3	4.1	4.2	4.0	4.3	3.7	3.8	3.8	4.2	4.8	4.2	4.8	4.4
Port Huron, Mich.	9.9	9.8	10.0	10.0	9.9	9.7	9.5	9.0	9.7	11.6	12.8	12.7	12.9	13.3	13.3	13.1	11.8	10.1	9.0	9.4	9.7	9.3	9.4	9.5	10.6
Portland, Me.	6.8	6.5	6.9	6.4	6.7	7.2	6.9	7.7	8.6	8.8	9.3	9.2	9.5	10.0	9.5	9.4	8.5	7.4	6.9	7.1	6.9	7.5	7.2	7.0	7.8
Portland, Oreg.	6.0	6.4	6.2	6.4	6.7	6.4	6.4	6.5	6.3	6.2	5.7	5.9	6.1	6.5	6.9	7.6	7.4	7.7	7.6	7.2	6.2	6.6	6.0	6.2	6.5
Pueblo, Colo.	5.6	5.3	5.1	5.5	5.6	5.4	4.7	4.1	4.1	4.5	4.4	5.3	6.6	7.5	7.9	8.8	9.1	8.9	8.4	7.3	6.5	5.4	4.8	5.4	6.1
Raleigh, N. C.	5.0	4.9	4.9	4.9	4.4	4.4	4.7	4.9	6.0	6.9	7.3	7.1	7.4	7.4	7.4	6.8	6.1	4.5	4.4	4.5	4.7	4.9	5.1	5.0	5.6
Rapid City, S. Dak.	8.1	8.1	8.2	7.6	8.6	9.2	9.3	9.3	9.6	9.5	9.7	11.3	12.6	13.3	13.5	13.3	12.3	11.6	10.3	7.2	6.8	7.7	8.2	7.7	9.7
Redbluff, Cal.	5.5	5.3	5.1	5.5	5.6	5.7	5.5	6.4	6.1	6.0	6.2	6.4	7.4	7.5	7.6	7.7	7.9	7.8	7.1	6.5	6.0	6.5	5.9	5.9	6.4
Rochester, N. Y.	4.9	5.1	5.5	6.0	6.0	6.2	6.0	6.4	7.5	8.2	8.5	9.0	10.1	9.6	9.3	8.5	7.4	6.0	5.5	5.4	5.2	5.1	4.7	4.6	6.7
Roseburg, Oreg.	1.5	1.2	1.6	1.4	1.2	1.2	0.8	1.1	0.8	1.1	1.1	1.5	2.0	2.6	2.9	3.4	4.3	5.1	5.3	5.3	3.3	2.0	1.4	1.5	2.2
Sacramento, Cal.	8.1	7.7	7.9	8.3	8.3	7.8	7.9	7.6	6.9	6.2	5.8	5.9	7.3	7.9	7.6	7.8	8.1	7.9	7.7	7.3	7.4	8.5	9.2	9.4	7.7
St. Louis, Mo.	9.1	9.5	9.3	9.3	9.3	9.6	9.4	8.9	9.3	9.9	10.8	10.9	11.5	11.8	12.1	12.2	12.3	11.4	10.0	10.0	10.4	10.5	10.2	9.3	10.3
St. Paul, Minn.	5.0	4.8	5.1	5.0	5.3	5.3	5.1	5.0	5.5	6.2	7.6	8.3	8.8	9.4	9.9	10.3	9.5	8.4	6.9	6.8	6.7	6.2	5.6	5.6	6.8
Salt Lake City, Utah.	4.4	4.5	4.0	4.0	4.0	4.4	4.3	4.7	4.3	4.0	4.2	4.6	5.8	7.7	9.4	10.8	10.2	9.5	7.9	5.8	4.7	4.1	4.3	5.1	5.7
San Antonio, Tex.	5.2	5.2	4.9	4.7	4.7	5.1	5.4	5.9	5.6	5.6	6.3	6.9	7.4	7.1	7.1	6.5	6.6	6.5	6.6	6.4	6.3	6.9	6.7	5.8	6.1
San Diego, Cal.	2.4	2.1	2.4	1.9	2.3	2.3	2.6	2.8	2.8	3.3	2.5	2.9	4.7	6.7	7.9	8.7	8.7	8.2	8.0	6.6	4.7	2.8	2.8	2.3	4.3
Sandusky, Ohio	8.8	8.2	8.5	8.4	8.0	8.1	8.1	8.1	8.0	8.6	9.3	10.0	9.9	10.3	10.1	9.6	9.0	8.7	8.9	8.2	8.3	8.5	8.5	8.6	8.8
San Francisco, Cal.	8.9	7.8	7.0	7.0	6.9	6.2	5.7	5.8	5.5	5.7	5.5	5.4	5.5	6.9	9.5	12.1	14.6	16.6	17.7	18.3	17.0	13.2	11.2	10.2	9.6
San Luis Obispo, Cal.	2.1	2.2	2.4	2.8	2.8	3.3	2.9	3.1	2.4	2.3	2.6	3.9	4.6	5.5	6.4	7.0	7.9	7.9	6.3	6.0	5.4	4.0	3.2	2.9	4.1
Santa Fe, N. Mex.	5.5	4.9	4.7	4.8	5.1	4.8	3.8	3.7	3.5	4.2	5.8	6.9	7.5	7.6	7.9	7.6	7.6	7.5	6.1	4.9	5.0	4.7	4.8	5.0	5.6
Sault Ste Marie, Mich.	7.7	7.2	6.6	6.3	6.1	6.6	6.9	6.7	7.7	8.5	8.6	9.1	9.5	10.0	10.0	10.7	10.8	9.5	8.5	8.1	7.8	7.6	7.9	7.5	8.2
Savannah, Ga.	7.3	7.2	6.9	6.8	7.1	7.1	7.5	7.5	7.6	8.3	8.6	9.0	9.2	9.8	10.2	10.1	9.6	8.5	7.6	7.8	7.3	7.3	7.2	7.5	8.0
Seattle, Wash.	3.1	2.7	3.3	2.6	2.8	3.3	3.5	3.3	3.1	3.3	3.5	3.7	4.0	4.3	4.5	4.9	5.3	5.6	5.1	5.4	4.8	3.9	3.5	2.9	3.8
Shreveport, La.	5.7	5.6	5.6	5.4	5.5	5.2	5.1	5.1	4.9	5.7	5.8	5.5	6.0	5.9	6.1	6.2	6.2	6.1	4.5	4.9	5.2	5.7	5.9	6.1	5.6
Sioux City, Iowa.	8.6	8.7	8.9	8.3	9.2	9.4	9.0	8.7	8.6	9.4	10.4	11.1	12.0	12.7	13.4	13.5	12.7	12.0	9.0	8.9	9.1	8.5	9.4	9.3	10.0
Spokane, Wash.	3.8	3.4	3.2	3.0	2.4	2.4	2.4	2.5	2.2	2.4	3.0	3.6	5.3	5.3	6.1	5.6	5.4	5.0	4.9	4.0	3.3	3.2	3.1	3.5	3.7
Springfield, Ill.	7.5	7.4	7.5	7.4	7.9	7.8	8.0	8.3	8.7	9.0	9.5	10.0	10.7	10.8	11.1	11.2	10.5	8.2	7.2	7.2	7.8	7.6	7.7	7.6	8.6
Springfield, Mo.	8.8	9.4	9.1	9.1	8.7	9.0	8.7	8.7	8.7	9.7	11.1	10.9	11.3	11.2	11.1	10.9	10.6	9.3	8.1	8.5	8.9	9.1	8.6	8.7	9.5
Tampa, Fla.	4.6	4.4	4.1	4.2	3.9	4.1	4.5	4.8	5.2	6.2	6.7	6.5	7.6	7.1	7.2	7.2	6.7	5.7	5.2	4.8	4.9	4.5	4.4	4.4	5.4
Tatoosh Island, Wash.	10.0	10.5	11.0	11.5	11.4	11.3	10.7	11.0	11.2	11.4	11.6	11.5	11.4	12.2	10.5	11.1	10.6	10.2	10.1	9.3	8.4	9.5	9.6	10.4	10.7
Toledo, Ohio.	8.0	7.8	7.6	8.0	7.8	8.0	7.8	7.5	8.2	9.6	9.7	10.6	11.5	11.8	11.9	11.8	11.2	9.6	7.9	7.9	7.8	8.1	7.7	8.1	9.0
Vicksburg, Miss.	5.4	5.2	5.4	5.8	5.3	5.3	5.6	5.2	6.1	5.9	5.7	6.0	6.3	5.8	6.3	6.0	6.2	4.9	4.0	4.8	5.4	5.3	5.7	5.4	5.5
Vineyard Haven, Mass.	10.9	10.8	10.9	10.5	10.4	10.6	10.6	10.7	11.6	12.2	12.0	12.3	12.3	12.3	12.6	12.0	11.8	11.5	11.6	11.7	11.1	11.1	11.1	11.6	11.4
Walla Walla, Wash.	4.9	4.5	4.1	4.4	3.9	3.7	4.0	4.2	4.4	4.3	4.4	4.5	5.1	5.5	5.8	6.0	5.6	5.4	5.3	4.8	4.3	4.8	4.6	4.9	4.7
Washington, D. C.	5.0	4.5	4.5	4.4	4.3	4.9	5.8	6.4	7.3	9.0	9.4	9.5	10.0	10.2	9.8	9.4	8.2	6.5	5.5	5.3	5.4	5.4	5.2	4.9	6.7
Wichita, Kans.	7.1	6.7	6.2	6.2	7.0	7.2	7.2	7.1	6.9	7.5	8.8	9.4	9.3	9.3	9.2	9.3	9.0	8.4	6.6	6.2	6.3	6.9	7.3	7.3	7.6
Williston, N. Dak.	4.9	5.5	5.2	5.4	5.4	5.5	5.6	5.4	5.3	5.2	7.3	8.7	9.0	10.8	11.5	11.4	10.9	10.5	8.6	6.7	6.3	5.7	5.7	5.4	7.2
Wilmington, N. C.	7.3	7.6	7.6	7.9	7.8	7.7	7.7	8.4	9.7	10.6	10.6	10.4	10.7	10.7	10.6	10.5	8.9	7.7	7.3	7.1	7.1	6.8	7.0	7.2	8.5
Winnemucca, Nev.	8.4	8.3	8.2	7.9	8.4	8.1	8.2	8.5	8.2	8.0	8.7	8.8	8.5	9.3	9.7	9.6	9.4	8.3	8.5	7.2	6.2	5.9	5.7	7.3	8.1
Woods Hole, Mass.	16.1	16.3	16.2	15.9	14.7	14.9	14.7	15.2	15.1	14.8	15.1	15.3	15.9	16.5	16.4	16.9	16.6	16.4	16.1	16.8	16.0	16.3	16.7	16.5	15.9
Yuma, Ariz.	3.4	2.9	2.5	2.6	2.8	2.8	3.2	3.3	3.5	3.3	4.1	5.9	6.3	6.0	6.1	6.1	5.8	5.8	5.4	5.8	5.4	5.0	4.5	3.6	4.4

TABLE VIII.—*Heights of rivers above low-water mark, October, 1896.*

Stations.	Distance to mouth of river.	Danger-point on gauge.	Highest water.		Lowest water.		Me'n stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Mississippi River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
St. Paul, Minn.	2,057	14.0	2.5	31	1.8	8,9	2.1	0.7
La Crosse, Wis.	1,867	10.0	2.1	31	1.2	7-18	1.3	0.9
Dubuque, Iowa.	1,759	15.0	1.6	31	0.6	19-22	0.9	1.0
Davenport, Iowa.	1,653	15.0	1.9	31	1.0	20-25	1.3	0.9
Keokuk, Iowa.	1,523	14.0	1.6	1	0.1	25-29	0.8	1.5
Hannibal, Mo.	1,462	17.0	2.3	1	0.6	26-30	1.4	1.7
St. Louis, Mo.	1,321	30.0	7.6	1	4.4	31	5.8	3.2
Memphis, Tenn.	910	33.0	7.8	15	2.4	27,28	4.2	5.4
Helena, Ark.	834	37.0	12.1	16	4.7	29	7.3	7.4
Arkansas City, Ark.	702	42.0	11.0	17,18	4.0	31	6.7	7.0
Greenville, Miss.	662	40.0	8.9	18	3.7	10,30,31	5.6	5.2
Vicksburg, Miss.	541	41.0	.....	.....	.....	.....	.....	.....
New Orleans, La.	108	13.0	4.7	10	2.9	6-8	3.6	1.8
Missouri River.								
Fort Pierre, S. Dak.	1,132	14.0	2.1	1	1.5	30	1.8	0.6
Sioux City, Iowa.	802	18.7	5.1	31	4.6	14,18	4.8	0.5
Omaha, Nebr.	667	18.0	.....	.....	.....	.....	.....	.....
Kansas City, Mo.	386	21.0	7.6	1	6.8	27-29	7.2	0.8
Ohio River.								
Parkersburg, W. Va.	786	38.0	16.8	3	6.9	14	9.6	9.9
Catlettsburg, Ky.	652	50.0	22.5	4	6.5	14	12.0	16.0
Cincinnati, Ohio.	500	45.0	25.4	6	9.8	16	14.8	15.6
Louisville, Ky.	368	24.0	10.0	7	5.9	18	7.4	4.1
Evansville, Ind.	184	30.0	16.4	9	3.2	1	9.3	13.2
Paducah, Ky.	47	40.0	11.0	11,12	1.8	1,2	5.6	9.2
Cairo, Ill.	1,140*	40.0	14.9	12	7.0	4	9.7	7.9
Monongahela River.								
Pittsburg, Pa.	966†	22.0	12.4	1	3.0	9,31	6.1	9.4
Great Kanawha River.								
Charleston, W. Va.	61	30.0	10.9	2	3.6	8	5.5	7.3

Stations.	Distance to mouth of river.	Danger-point on gauge.	Highest water.		Lowest water.		Me'n stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Big Sandy River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Louisa, Ky.	26	.....	6.9	15	3.8	11,31	4.6	3.1
Wabash River.								
Mount Carmel, Ill.	50	15.0	9.8	7	2.5	27-31	4.6	7.3
Cumberland River.								
Burnside, Ky.	404	50.0	3.8	18	0.8	1	2.0	3.0
Nashville, Tenn.	145	40.0	5.6	2	0.8	22,23	1.8	4.8
Tennessee River.								
Knoxville, Tenn.	640	29.0	.....	.....	.....	.....	.....	.....
Chattanooga, Tenn.	455	33.0	3.0	4	1.1	29,30	1.6	1.9
Johnsonville, Tenn.	94	21.0	1.6	10,11	0.3	20,21,31	0.9	1.3
Arkansas River.								
Fort Smith, Ark.	351	22.0	3.2	25	1.0	22,23	1.8	2.2
Little Rock, Ark.	176	23.0	3.9	30,31	2.6	22	3.0	1.3
Red River.								
Shreveport, La.	449	29.2	— 2.6	31	— 3.4	17-20	—3.1	0.8
James River.								
Lynchburg, Va.	251	18.0	9.6	1	0.2	30,31	1.1	9.4
Congaree River.								
Columbia, S. C.	.....	15.0	6.2	1	0.8	14,21,22	1.4	5.4
Savannah River.								
Augusta, Ga.	140	32.6	8.7	1	3.4	23	4.5	5.3
Alabama River.								
Montgomery, Ala.	215	48.0	2.3	5	— 1.2	21-23	—0.3	3.5
Willamette River.								
Portland, Oreg.	.....	15.0	2.9	10	0.0	15,16,30	1.3	2.9
Sacramento River.								
Redbluff, Cal.	.....	20.0	1.3	27	0.3	6-26	0.4	1.0
Sacramento, Cal.	.....	28.0	9.6	30	8.5	13-26	8.7	1.1

*To mouth of Mississippi River. †To mouth of Ohio River.

TABLE IX.—*Resultant winds from observations at 8 a. m. and 8 p. m., daily, during October, 1896.*

Stations.	Component direction from—				Resultant.		Stations.	Component direction from—				Resultant.	
	N.	S.	E.	W.	Direction from—	Duration.		N.	S.	E.	W.	Direction from—	Duration.
New England.	*Hours.*	*Hours.*	*Hours.*	*Hours.*	°	*Hours.*	*Upper Lake Region*—Cont'd.	*Hours.*	*Hours.*	*Hours.*	*Hours.*	°	*Hours.*
Eastport, Me	24	14	13	20	n. 35 w.	12	Milwaukee, Wis	23	18	14	23	n. 61 w.	10
Portland, Me	24	11	5	29	n. 62 w.	27	Greenbay, Wis	16	27	10	22	s. 47 w.	16
Northfield, Vt	28	26	3	12	n. 77 w.	9	Duluth, Minn	28	9	12	27	n. 38 w.	24
Boston, Mass	27	14	10	24	n. 47 w.	19	*North Dakota.*						
Nantucket, Mass	29	13	17	20	n. 11 w.	16	Moorhead, Minn	32	18	4	16	n. 41 w.	18
Woods Hole, Mass.*	11	6	8	13	n. 45 w.	7	Bismarck, N. Dak	33	10	19	19	n.	23
Block Island, R. I	30	12	19	21	n. 6 w.	18	Williston, N. Dak	32	16	12	11	n. 3 e.	16
New Haven, Conn	33	12	7	20	n. 31 w.	25	*Upper Mississippi Valley.*						
Middle Atlantic States.							St. Paul, Minn	15	20	18	25	s. 54 w.	9
Albany, N. Y	28	16	4	20	n. 53 w.	20	La Crosse, Wis.†	8	18	2	7	s. 27 w.	11
Binghamton, N. Y	15	2	9	13	n. 17 w.	14	Davenport, Iowa	16	11	25	23	n. 22 e.	5
New York, N. Y	29	13	13	22	n. 29 w.	18	Des Moines, Iowa	22	19	19	17	n. 34 e.	4
Harrisburg, Pa	23	7	21	24	n. 11 w.	16	Dubuque, Iowa	17	24	13	22	s. 52 w.	11
Philadelphia, Pa	32	10	9	23	n. 32 w.	26	Keokuk, Iowa	26	18	18	14	n. 27 e.	9
Baltimore, Md	28	12	13	20	n. 24 w.	18	Cairo, Ill	20	22	17	17	s.	2
Washington, D. C	31	16	10	16	n. 22 w.	16	Springfield, Ill	25	22	15	19	n. 53 w.	5
Lynchburg, Va	22	15	15	21	n. 41 w.	9	Hannibal, Mo	16	20	18	22	s. 45 w.	6
Norfolk, Va	30	15	18	15	n. 11 e.	15	St. Louis, Mo	20	18	15	23	n. 74 w.	7
South Atlantic States.							*Missouri Valley.*						
Charlotte, N. C	21	19	26	11	n. 82 e.	15	Columbia, Mo.*	10	9	9	12	n. 72 w.	3
Hatteras, N. C	31	10	22	15	n. 18 e.	22	Kansas City, Mo	21	24	17	17	s.	3
Kittyhawk, N. C	27	12	27	15	n. 39 e.	19	Springfield, Mo	20	21	20	13	s. 82 e.	7
Raleigh, N. C	32	17	13	14	n. 4 w.	15	Omaha, Nebr	33	19	11	9	n. 8 e.	14
Wilmington, N. C	26	11	23	16	n. 25 e.	17	Sioux City, Iowa†	12	11	10	8	n. 63 e.	2
Charleston, S. C	27	12	23	17	n. 22 e.	16	Pierre, S. Dak	24	18	24	15	n. 56 e.	11
Augusta, Ga	28	8	16	21	n. 14 w.	21	Huron, S. Dak	29	16	15	18	n. 13 w.	13
Savannah, Ga	26	15	16	15	n. 5 e.	11	*Northern Slope.*						
Jacksonville, Fla	27	12	22	17	n. 18 e.	16	Havre, Mont	18	10	20	27	n. 41 w.	11
Florida Peninsula.							Miles City, Mont	24	21	16	14	n. 34 e.	4
Jupiter, Fla	23	11	27	18	n. 37 e.	15	Helena, Mont	4	26	2	46	s. 63 w.	49
Key West, Fla	21	6	40	6	n. 66 e.	37	Rapid City, S. Dak	18	21	10	32	s. 82 w.	22
Tampa, Fla	26	5	20	13	n. 13 e.	32	Cheyenne, Wyo	30	14	7	25	n. 48 w.	24
Eastern Gulf States.							Lander, Wyo	13	29	14	24	s. 32 w.	19
Atlanta, Ga	28	9	22	25	n. 9 w.	19	North Platte, Nebr	17	15	15	25	n. 79 w.	10
Pensacola, Fla	32	12	19	10	n. 24 e.	22	*Middle Slope.*						
Mobile, Ala	34	16	10	12	n. 6 w.	18	Denver, Colo	17	28	15	10	s. 34 e.	12
Montgomery, Ala	29	9	26	15	n. 29 e.	23	Pueblo, Colo	23	15	16	22	n. 37 w.	10
Vicksburg, Miss	27	15	24	9	n. 51 e.	19	Concordia, Kans	23	23	8	18	w.	10
New Orleans, La	28	10	28	11	n. 43 e.	25	Dodge City, Kans	24	17	24	10	n. 63 e.	16
Western Gulf States.							Wichita, Kans	23	23	15	11	e.	4
Shreveport, La	22	15	26	16	n. 55 e.	12	Oklahoma, Okla	25	23	15	10	n. 68 e.	5
Fort Smith, Ark	17	9	32	13	n. 67 e.	21	*Southern Slope.*						
Little Rock, Ark	21	13	19	21	n. 14 w.	8	Abilene, Tex	21	27	18	13	s. 40 e.	8
Corpus Christi, Tex	25	10	26	9	n. 48 e.	23	Amarillo, Tex	14	31	12	13	s. 3 w.	17
Galveston, Tex	26	15	26	8	n. 59 e.	21	*Southern Plateau.*						
Palestine, Tex	31	13	24	11	n. 36 e.	22	El Paso, Tex	19	5	26	26	n.	14
San Antonio, Tex	32	16	21	3	n. 48 e.	24	Santa Fe, N. Mex	14	27	23	14	s. 35 e.	16
Ohio Valley and Tennessee.							Phœnix, Ariz	6	32	15	20	s. 11 w.	26
Chattanooga, Tenn	19	19	15	24	w.	9	Yuma, Ariz	22	13	19	20	n. 6 w.	9
Knoxville, Tenn	25	12	13	25	n. 43 w.	18	*Middle Plateau.*						
Memphis, Tenn	26	16	15	15	n.	10	Carson City, Nev	16	16	15	21	w.	6
Nashville, Tenn	22	20	15	21	n. 72 w.	6	Winnemucca, Nev	25	11	19	19	n.	14
Lexington, Ky	17	24	16	21	s. 36 w.	9	Salt Lake City, Utah	16	17	24	22	s. 63 e.	2
Louisville, Ky	28	20	9	17	n. 45 w.	11	*Northern Plateau.*						
Indianapolis, Ind	18	14	14	19	n. 51 w.	6	Baker City, Oreg	18	24	9	14	s. 40 w.	8
Cincinnati, Ohio	23	17	23	17	n. 45 e.	8	Idaho Falls, Idaho	27	24	4	23	n. 81 w.	19
Columbus, Ohio	24	15	19	18	n. 6 e.	9	Spokane, Wash	11	32	16	12	s. 11 e.	21
Pittsburg, Pa	18	16	12	28	n. 83 w.	16	Walla Walla, Wash	13	32	12	13	s. 3 w.	19
Parkersburg, W. Va	21	15	18	21	n. 27 w.	7	*North Pacific Coast Region.*						
Lower Lake Region.							Fort Canby, Wash	18	24	18	15	s. 27 e.	7
Buffalo, N. Y	16	14	20	24	n. 63 w.	4	Port Angeles, Wash.*	1	9	13	11	s. 14 e.	8
Oswego, N. Y	19	27	19	15	s. 27 e.	9	Seattle, Wash	20	20	21	12	e.	9
Rochester, N. Y	14	21	16	27	s. 58 w.	13	Tatoosh Island, Wash	2	23	30	12	s. 41 e.	28
Erie, Pa	19	18	17	22	n. 79 w.	5	Portland, Oreg	30	16	9	26	n. 51 w.	22
Cleveland, Ohio	13	24	21	17	s. 20 e.	12	Roseburg, Oreg	25	12	12	20	n. 32 w.	15
Sandusky, Ohio	22	16	18	20	n. 18 w.	6	*Middle Pacific Coast Region.*						
Toledo, Ohio	17	15	15	26	n. 80 w.	11	Eureka, Cal	23	16	16	22	n. 41 w.	9
Detroit, Mich	20	18	16	23	n. 74 w.	7	Redbluff, Cal	35	13	12	19	n. 13 w.	23
Upper Lake Region.							Sacramento, Cal‡	22	19	5	4	n. 18 e.	3
Alpena, Mich	18	21	14	26	s. 76 w.	12	San Francisco, Cal	4	18	2	45	s. 72 w.	45
Grand Haven, Mich	25	13	22	16	n. 27 e.	13	*South Pacific Coast Region.*						
Marquette, Mich	22	22	13	23	w.	10	Fresno, Cal	27	8	13	29	n. 40 w.	25
Port Huron, Mich	20	22	14	20	s. 72 w.	6	Los Angeles, Cal	19	7	16	32	n. 53 w.	20
Sault Ste. Marie, Mich	16	20	22	16	s. 56 e.	7	San Diego, Cal	29	10	8	28	n. 46 w.	28
Chicago, Ill	22	21	12	17	n. 79 w.	5	San Luis Obispo, Cal	28	13	9	21	n. 39 w.	19

*From observations at 8 p. m. only. †From observations at 8 a. m. only. ‡For 23½ days.

TABLE X.—*Thunderstorms and auroras, October, 1896.*

States.	No. of stations.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total. No.	Total. Days.	
Alabama	53	T.																							1	1			1	1	3	3		10	6	T.
		A.																																0	0	A.
Arizona	48	T.	5	2	1			1					4	5						1		2	3	7	1									32	11	T.
		A.																																0	0	A.
Arkansas	51	T.						1				5	1								1	5		2					2	1		1	19	9	T.
		A.																																0	0	A.
California	197	T.																1			1	1					2	1	2					8	6	T.
		A.																																0	0	A.
Colorado	70	T.		1	2				2	4	1														2	1		1	1				12	9	T.
		A.																																0	0	A.
Connecticut	22	T.										1																						1	1	T.
		A.																																0	0	A.
Delaware	6	T.								1																								2	1	T.
		A.																																0	0	A.
Dist. of Columbia	4	T.																																1	1	T.
		A.																																2	1	A.
Florida	38	T.									1			2				2	1			1			2	1		1	1					2	2	T.
		A.																																0	0	A.
Georgia	49	T.																							2	1		1	1					12	9	T.
		A.																																0	0	A.
Idaho	36	T.																																0	0	T.
		A.																																0	0	A.
Illinois	97	T.		1				3				1									4													1	1	T.
		A.										1																						21	6	A.
Indiana	48	T.																		1	1		1		1	1			4	8				5	T.
		A.																			4								1					5	2	A.
Indian Territory	6	T.										1																						0	2	T.
		A.																											1					2	2	A.
Iowa	101	T.	3	4		3					2					1													6	12	13			43	7	T.
		A.																			2			4					15	5				42	9	A.
Kansas	73	T.				3	4	1			7	1									1													1	1	T.
		A.												1																				1	1	A.
Kentucky	47	T.																			1													1	1	T.
		A.																																0	0	A.
Louisiana	48	T.						2			3										4	3	3	2				8	6	14		1	46	10	T.
		A.																																0	0	A.
Maine	16	T.																															4	4	1	T.
		A.																																16	5	A.
Maryland	31	T.							4	5	5	1	1											4										4	1	T.
		A.																																0	0	A.
Massachusetts	77	T.																																0	0	T.
		A.							3	4	3																		1		1	1	1	14	7	A.
Michigan	96	T.		1		3		1		1											1								1	21	3	3	1	31	7	T.
		A.								1	2			1																				6	4	A.
Minnesota	69	T.											1																10	5	2			20	5	T.
		A.										1	1								4	1		2		1		1	3	8	1			4	3	A.
Mississippi	52	T.																																23	10	T.
		A.																																0	0	A.
Missouri	96	T.	3	1			1	2				3	2								5	2		1				1	10	11	1		48	13	T.
		A.		1																														1	1	A.
Montana	40	T.																																13	6	T.
		A.																											7		2			19	6	A.
Nebraska	112	T.	2			5	1				3	3	1		2	1																		0	0	T.
		A.									2																							7	7	A.
Nevada	39	T.						1	1	1	1										1		1					1						0	0	T.
		A.																																2	1	A.
New Hampshire	23	T.							1	4	4	1	1																				2	1	T.
		A.																						1									1	1	A.
New Jersey	54	T.		2	2	2	1	1	2		2		1	1	2					1	1	1	1	2	1			1					0	0	T.
		A.																																24	17	A.
New Mexico	36	T.																																0	0	T.
		A.																																5	3	A.
New York	93	T.																																3	2	T.
		A.									1	2			1	3																		0	0	A.
North Carolina	60	T.																1						2			1					5	2	T.
		A.																																13	6	A.
North Dakota	39	T.																																0	0	T.
		A.	1								6	3	3			1													2					2	1	A.
Ohio	140	T.																																14	5	T.
		A.																											1					1	1	A.
Oklahoma	20	T.																																0	0	T.
		A.								1	1														1			1	4				8	2	A.
Oregon	60	T.																																0	0	T.
		A.																																0	0	A.
Pennsylvania	93	T.																																0	0	T.
		A.							1	1	3			.8															1		1	1	3	3	A.
Rhode Island	6	T.																																5	3	T.
		A.																																0	0	A.
South Carolina	42	T.		1								1	2																					0	0	T.
		A.																														1		5	4	A.
South Dakota	46	T.								1																								0	0	T.
		A.											1	1																				1	1	A.
Tennessee	49	T.		1								1	2								1													2	2	T.
		A.																																5	4	A.
Texas	91	T.		1				1		1			2	1					1		3	5	5	1				4	8	9	1	6	49	15	T.
		A.							1			1	1									2	1					1	1					8	7	A.
Utah	32	T.																																2	1	T.
		A.							1	1		1												2										2	2	A.
Vermont	13	T.																																3	3	T.
		A.																						2										2	1	A.
Virginia	37	T.																																0	0	T.
		A.																											1					1	1	A.
Washington	51	T.																																0	0	T.
		A.																																0	0	A.
West Virginia	37	T.											2																					2	1	T.
		A.																																0	0	A.
Wisconsin	58	T.																																0	0	T.
		A.								1			1	1														5	12	4			21	3	A.
Wyoming	11	T.																																3	3	T.
		A.																																0	0	A.
Sums	2,713	T.	13	15	5	13	7	11	8	7	21	15	13	18	6	0	0	3	2	2	19	26	15	24	23	4	3	4	46	114	83	14	26	569	....	T.
		A.	1	1	0	3	0	0	12	20	27	9	10	6	2	1	0	0	1	1	1	0	1	0	0	1	1	0	1	0	1	4	2	105	....	A.

TABLE XI.—*Hourly sunshine as deduced from sunshine recorders, October, 1896.*

Stations.	Instrument.	Percentages for each hour of local mean time ending with the respective hour.																Monthly summary.			
		A. M.								P. M.								Instrumental record.			Personal estimate.
		5	6	7	8	9	10	11	Noon	1	2	3	4	5	6	7	8	Actual.	Possible.	Per cent of possible.	
																		Hours.	*Hours.*		
Atlanta, Ga	T.	.....	100	51	48	48	58	60	67	63	65	57	46	42	52	.....	.....	193.3	350.9	55	58
Baltimore, Md	T.	.....	0	26	30	40	53	56	56	58	61	49	37	28	25	.....	.....	153.9	346.0	44	54
Binghamton, N. Y	T.	.....	0	12	20	26	26	31	32	28	27	24	26	29	13	.....	.....	87.3	342.5	25	26
Bismarck, N. Dak	P.	.....	0	51	51	54	64	64	63	63	66	61	54	56	69	.....	.....	199.4	336.7	59	60
Boston, Mass	T.	.....	0	31	44	36	43	47	42	40	41	35	39	32	13	.....	.....	131.8	342.5	38	31
Buffalo, N. Y	T.	.....	0	27	35	40	45	53	55	55	53	48	39	33	22	.....	.....	149.3	341.8	44	35
Cheyenne, Wyo ●	P.	.....	82	69	76	82	90	90	85	84	78	79	70	59	47	.....	.....	267.0	343.9	78	55
Chicago, Ill	T.	.....	0	42	44	57	64	80	78	78	75	72	56	47	53	.....	.....	216.9	342.5	63	55
Cincinnati, Ohio	T.	.....	64	69	68	73	75	76	75	75	74	74	70	58	57	.....	.....	246.2	346.0	71	62
Cleveland, Ohio	P.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	52
Columbus, Ohio	T.	.....	0	22	26	41	66	69	70	71	70	65	56	38	23	.....	.....	185.5	344.9	54	42
Denver, Colo	P.	.....	100	45	59	63	72	79	76	86	83	77	71	57	54	.....	.....	240.8	344.9	70	59
Des Moines, Iowa	T.	.....	0	73	75	75	78	81	84	82	80	70	69	67	71	.....	.....	259.0	342.5	76	68
Detroit, Mich	T.	.....	0	47	52	64	65	69	76	76	74	62	53	37	41	.....	.....	210.5	342.5	61	58
Dodge City, Kans	P.	.....	90	66	72	72	75	77	77	76	75	75	70	61	63	.....	.....	250.7	347.3	72	64
Dubuque, Iowa *	T.	.....	.....	12	22	42	67	72	70	68	65	65	53	36	27	.....	.....	149.4	284.3	53	55
Eastport, Me	P.	.....	0	18	24	33	41	38	33	40	46	45	42	24	18	.....	.....	119.2	339.8	35	28
Eureka, Cal	P.	.....	0	26	32	35	44	49	50	51	59	50	49	45	41	.....	.....	154.7	343.9	45	46
Fresno, Cal	T.	.....	50	74	75	85	85	86	88	96	95	90	83	64	70	.....	.....	290.5	347.9	84	75
Galveston, Tex	P.	.....	50	32	45	60	64	62	63	65	70	61	60	61	34	.....	.....	204.5	355.9	57	52
Helena, Mont	P.	.....	0	52	58	63	72	72	67	66	73	73	66	72	73	.....	.....	236.9	336.7	67	59
Kansas City, Mo	P.	.....	100	58	65	75	78	75	78	76	76	75	76	72	83	.....	.....	225.4	346.0	74	69
Little Rock, Ark	T.	.....	67	57	56	66	66	73	78	78	85	80	72	56	45	.....	.....	241.1	350.1	69	49
Los Angeles, Cal	P.	.....	33	47	59	71	72	79	79	81	90	93	93	80	78	.....	.....	270.7	350.9	77	68
Louisville, Ky	T.	.....	50	68	70	70	75	83	85	85	76	75	69	65	64	.....	.....	238.7	347.3	74	64
Minneapolis, Minn	T.	.....	0	43	49	60	70	71	69	67	65	59	54	56	67	.....	.....	206.5	339.8	61	.....
New Orleans, La	T.	.....	50	31	29	39	48	52	47	50	50	39	30	30	24	.....	.....	138.4	354.7	39	37
New York, N. Y. †	T.	.....	0	7	31	41	46	48	49	41	36	36	29	15	8	.....	.....	102.8	301.8	34	35
Northfield, Vt	P.	.....	0	15	18	35	43	48	46	44	41	41	38	22	16	.....	.....	121.5	340.5	36	26
Omaha, Nebr	P.	.....	0	44	53	71	73	75	74	75	76	68	63	51	39	.....	.....	224.7	343.9	65	56
Philadelphia, Pa	T.	.....	82	38	47	46	53	55	51	55	51	46	40	36	27	.....	.....	161.1	344.9	47	39
Phœnix, Ariz	P.	.....	100	79	82	82	81	86	82	86	83	80	74	75	77	.....	.....	284.1	351.5	81	73
Portland, Me	T.	.....	0	4	17	30	36	43	43	51	48	40	28	21	8	.....	.....	112.5	340.5	33	25
Portland, Oreg	T.	.....	0	37	34	45	55	62	71	73	71	68	62	56	71	.....	.....	198.1	338.5	59	57
Do	P.	.....	0	37	36	44	51	56	58	65	68	67	65	58	71	.....	.....	190.0	338.5	56	57
Rochester, N. Y	T.	.....	0	18	21	30	36	42	37	35	34	36	24	22	22	.....	.....	104.2	341.8	30	33
St. Louis, Mo	T.	.....	64	57	61	77	79	80	85	88	87	85	84	78	79	.....	.....	272.3	346.0	79	71
Salt Lake City, Utah	P.	.....	100	62	62	72	79	81	83	83	84	85	76	69	81	.....	.....	262.9	343.9	76	64
San Diego, Cal	P.	.....	0	33	38	55	65	80	80	82	80	81	83	77	70	.....	.....	342.4	351.5	69	69
San Francisco, Cal	T.	.....	0	4	40	61	74	85	88	91	92	92	80	53	32	.....	.....	239.1	347.3	69	66
Santa Fe, N. Mex	P.	.....	33	45	60	63	73	71	68	73	72	68	61	55	44	.....	.....	223.3	348.9	64	46
Savannah, Ga	P.	.....	60	44	53	71	72	77	64	64	62	63	66	57	55	.....	.....	221.2	352.8	63	58
Vicksburg, Miss	T.	.....	60	37	43	57	67	70	77	75	69	62	57	51	60	.....	.....	214.5	352.8	61	58
Washington, D. C	P.	.....	82	46	50	55	63	60	59	65	66	62	57	51	40	.....	.....	197.4	346.0	57	54
Wilmington, N. C	T.	.....	33	30	61	67	75	77	77	79	75	70	64	50	29	.....	.....	227.6	350.9	65	57

* All values for 26 days; the total possible sunshine and personal estimate for 31 days are 342.5 and 56, respectively.

† All values for 27 days; the total possible sunshine and personal estimate for 31 days are 343.9 and 36, respectively.

TABLE XII.—*Maximum rainfall in one hour or less, October,* 1896.

Stations.	Maximum rainfall in—						Stations.	Maximum rainfall in—					
	5 min.	Date.	10 min.	Date.	1 hour.	Date.		5 min.	Date.	10 min.	Date.	1 hour.	Date.
	Inch.		*Inch.*		*Inch.*			*Inch.*		*Inch.*		*Inch.*	
Atlanta, Ga	0.06	23	0.07	23	0.19	23	Milwaukee, Wis	0.09	30	0.14	30	0.20	30
Baltimore, Md	0.05	12	0.08	12	0.24	12	Nantucket, Mass †	0.20	24	0.30	24	0.68	24
Bismarck, N. Dak	0.02	4	0.04	4	0.20	4	Nashville, Tenn	0.06	11	0.10	11	0.35	11
Boston, Mass	0.09	18	0.09	18	0.17	15	New Orleans, La	0.20	27	0.35	27	1.00	27
Buffalo, N. Y	0.05	20	0.08	20	0.17	12	New York, N. Y	0.03	13	0.05	13	0.19	13
Chicago, Ill	0.07	17	0.10	17	0.32	17	Norfolk, Va *	.....	.....	.....	.....	.....	.....
Cincinnati, Ohio	0.11	30	0.12	30	0.29	30	Omaha, Nebr	0.07	29	0.14	29	0.56	29
Cleveland, Ohio	0.05	6	0.08	6	0.19	6	Philadelphia, Pa	0.03	12	0.06	12	0.24	12
Denver, Colo	0.01	9	0.01	9	0.05	9	Pittsburg, Pa	0.15	30	0.22	30	0.22	30
Detroit, Mich	0.05	6	0.09	6	0.30	6	Portland, Me	0.04	21	0.06	21	0.19	14
Dodge City, Kans	0.19	28	0.30	28	0.60	28	Portland, Oreg	0.07	31	0.09	31	0.15	31
Duluth, Minn	0.08	30	0.08	30	0.13	30	Rochester, N. Y	0.01	7	0.02	7	0.08	7
Eastport, Me	0.17	31	0.25	31	0.57	24	St. Louis, Mo	0.10	19	0.11	19	0.17	19
Galveston, Tex	0.07	29	0.14	29	0.47	29	St. Paul, Minn	0.09	29	0.15	29	0.36	29
Indianapolis, Ind	0.10	30	0.16	30	0.47	30	Salt Lake City, Utah	0.10	26	0.12	26	0.15	26
Jacksonville, Fla	0.06	9	0.07	9	0.26	23	San Diego, Cal	0.05	27	0.10	27	0.30	27
Jupiter, Fla	0.20	12	0.32	12	0.66	20	San Francisco, Cal	0.08	26	0.12	26	0.32	26
Kansas City, Mo	0.05	29	0.10	29	0.38	29	Savannah, Ga	0.12	24	0.22	24	0.28	10
Key West, Fla	0.53	9	0.37	9	0.65	9	Seattle, Wash	0.16	20	0.25	20	0.47	20
Little Rock, Ark	0.30	29	0.40	29	0.97	29	Vicksburg, Miss	0.30	23	0.53	23	0.90	23
Louisville, Ky	0.05	23	0.07	23	0.20	23	Washington, D. C	0.01	23	0.01	23	0.05	23–24
Memphis, Tenn *	.....	.....	.....	.....	.....	.....	Wilmington, N. C	0.15	3	0.27	3	0.86	3

* Self-register out of order.

† Partly estimated.

TABLE XIII.—*Excessive precipitation, by stations, for October, 1896.*

Stations.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Alabama.	*Inches.*	*Inches.*		*Ins.*	*h.m.*	
Alco		4.00	23	4.00	3 30	23
Brewton		3.00	23			
Daphne		3.00	28			
Mount Willing		3.12	23			
Arizona.						
Bisbee		3.30	1-2	1.88	0 30	1
Do				1.92	1 30	2
Do				1.52	0 30	13
Dragoon		2.54	13			
Arkansas.						
Blanchard Springs		2.56	22-23			
Do		2.95	29			
Camden		2.87	28-29			
Malvern		3.48	28-29			
Warren		2.80	29			
Winslow		3.97	28-29			
California.						
Azusa		2.93	27			
Claremont		4.83	26-27	2.00	2 00	27
Descanso		2.50	27			
Summerdale		2.53	26-27			
Upper Mattole		2.65	26			
Florida.						
Federal Point		6.48	8-10			
Lake City		4.15	23-24			
Macclenny		2.60	23-24			
Myers		3.30	16			
Tallahassee		3.18	23			
Indian Territory.						
Tulsa		2.50	28-29			
Iowa.						
Atlantic		3.50	28-29			
Council Bluffs		2.50	29			
Fayette		2.86	29			
Hampton		2.57	29			
Hawkeye		2.85	28-29			
Knoxville		3.40	29			
Malvern		3.55	28-29			
Millman		2.57	29			
Newton		2.70	29			
Oskaloosa		2.90	28-29			
Ovid		3.06	28-29			
Sac City		2.50	28-29			
Seymour		3.10	29			
Sidney		3.31	28-29			
Villisca		2.92	28-29			
Winterset		2.55	29			
Kansas.						
Blaine		2.70	28-29			
Campbell		2.73	28-29			
Frankfort		2.75	29			
Halstead		3.47	28	3.47	3 15	28
Manhattan		2.52	28-29			
Pleasant Dale		2.75	28-29			
White Rock		3.00	28-29			
Louisiana.						
Baton Rouge		3.76	27-28			
Davis		2.52	29			
Donaldsonville		3.01	27-28			
Emilie		3.55	27			
Farmerville		2.64	22			
Do		2.82	29			
Grand Coteau		6.81	27-29			
Lafayette		4.00	27			
Lake Charles		2.75	22-23			
Liberty Hill		2.86	28-29			
Mansfield		3.05	27-28			
Melville		3.90	28-29			
Minden		2.03	33-34			
Do		3.32	29-30			
New Orleans		2.66	27-28	1.00	1 00	27
Oberlin		8.00	28-29	4.00	2 00	29
Oxford		2.55	21			
Paincourtville		2.58	27-28			
Rayne		3.00	27-28			
Robeline		2.50	29			
Sugar Experiment Station		6.27	28-29			
Thibodeaux		2.50	26			
West End		3.65	27-28			
Maine.						
Bar Harbor		2.85	23-24			
Eastport		3.51	24			
Maryland.						
Darlington		3.08	12			
Massachusetts.						
Hyannis		2.75	23-24			
Nantucket		2.84	23-24			
Vineyard Haven		2.92	23-24			
Michigan.						
Escanaba		2.70	29			
Manistique		2.86	29			

TABLE XIII.—*Excessive precipitation.*—Continued.

Stations.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Michigan—Continued.	*Inches.*	*Inches.*		*Ins.*	*h.m.*	
Marquette		3.16	29-30			
Wetmore		3.00	29-30			
Minnesota.						
Caledonia		2.65	29			
Wabasha		2.74	29			
Winona		2.59	29			
Mississippi.						
Biloxi		4.21	26-27			
Briers		3.01	23			
Fayette		2.60	29			
Magnolia		3.12	23			
Water Valley				1.26	0 38	29
Woodville		2.55	29			
Missouri.						
Conception		2.68	28-29			
Nebraska.						
Auburn		2.97	28-29			
Hebron		2.52	28			
Nebraska City		4.02	28-29			
Nemaha		3.25	28-29			
Strang		2.50	28-29			
Syracuse		2.85	28-29			
Tecumseh		2.79	28-29			
Turlington		2.58	28-29			
Wilber		3.00	28-29			
New Hampshire.						
Grafton		3.00	13-14			
New Mexico.						
Shattucks Ranch		2.72	13			
New York.						
Addison		3.30	12-13			
Alfred		2.91	12-13			
Elmira		2.95	12-13			
Ithaca		3.00	13			
Perry City		2.78	12-13			
South Canisteo		5.43	12-13			
Wedgwood		3.52	12-13			
North Carolina.						
Hatteras		3.05	10-11			
Wilmington		2.68	3			
Oklahoma.						
Alva		4.50	22-23			
Anadarko		3.00	28			
Pond Creek		2.90	28			
Prudence		4.25	27-28			
Oregon.						
Astoria		2.53	29-30			
Pennsylvania.						
Aqueduct		2.75	11-12			
Duncannon		2.96	12			
East Bloomsburg		3.20	12-13			
Farrandsville		2.84	12-13			
Girardville		3.00	12			
Hamburg		3.05	12			
Lebanon		3.21	11-12			
Lock Haven		2.70	12-13			
Pottstown		3.00	12			
Renovo		2.88	12	2.33	1 30	12
Scranton		2.68	12-13			
Selinsgrove		3.25	12			
South Eaton		2.56	12-13			
Towanda		3.21	12-13			
Wellsboro		4.95	12-13			
Williamsport		4.48	12-13			
York		2.56	12			
South Dakota.						
Tyndall		3.14	29			
Tennessee.						
Brownsville		3.50	29			
Texas.						
Brownwood		4.45	6			
Colmesneil		2.95	29			
Corpus Christi				1.50	1 20	31
Durham		2.51	13			
Fredericksburg				1.14	0 30	29
Golindo		2.80	22			
Hale Center		3.00	15			
Hewitt		2.65	22			
Huntsville		3.55	29			
Longview		3.15	27-28			
Lufkin		2.60	29			
Palestine		2.73	22			
Panter				2.00	0 30	29
Round Rock		3.10	22			
Stafford		2.75	29			
Sulphur Springs		2.98	28-29			
Waco		3.27	22-23			
Do		2.56	28-29			
Wisconsin.						
Dodgeville		3.20	29			
Greenbay				1.10	1 00	29

Chart I. Tracks of Centers of Low Areas. October, 1896.

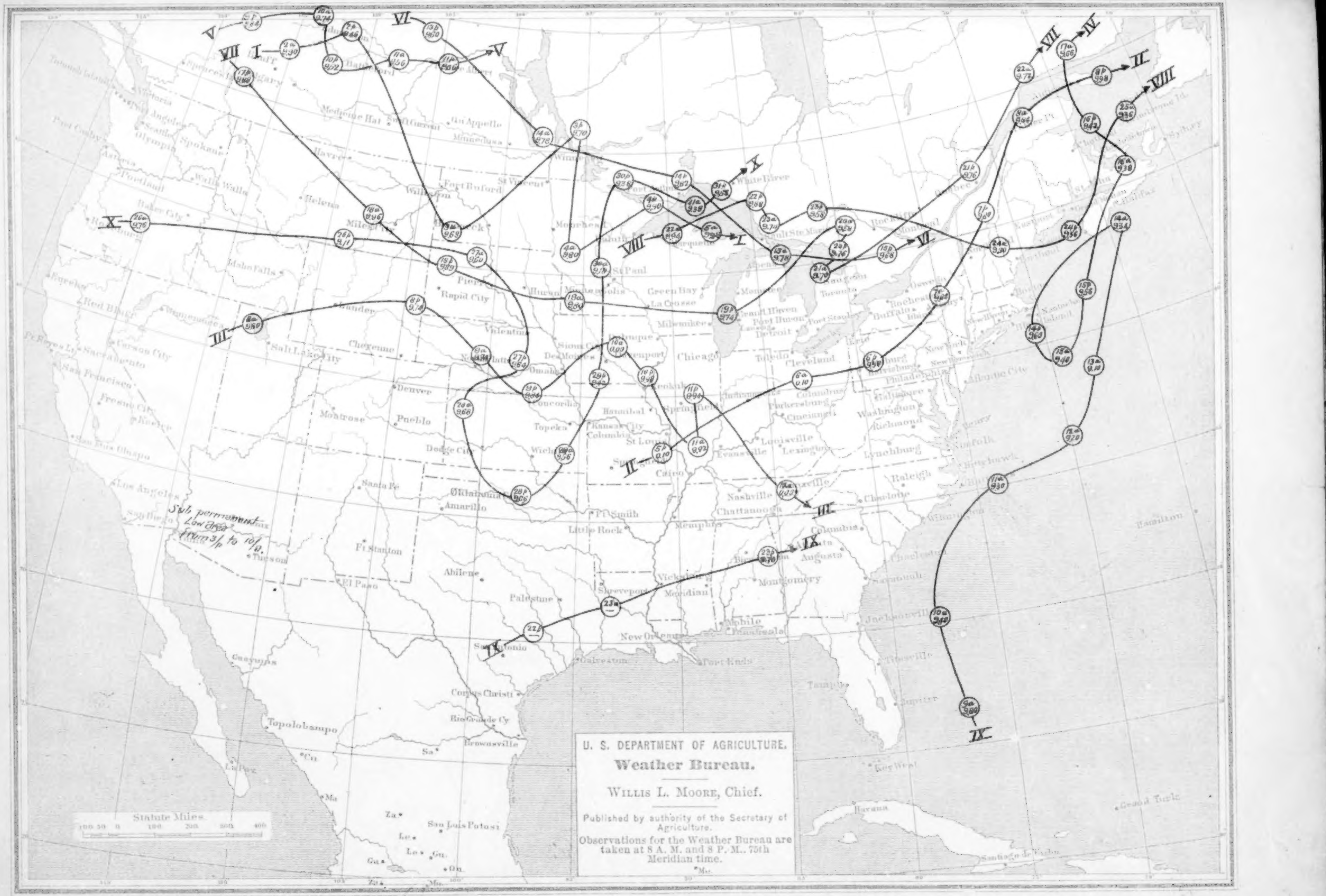
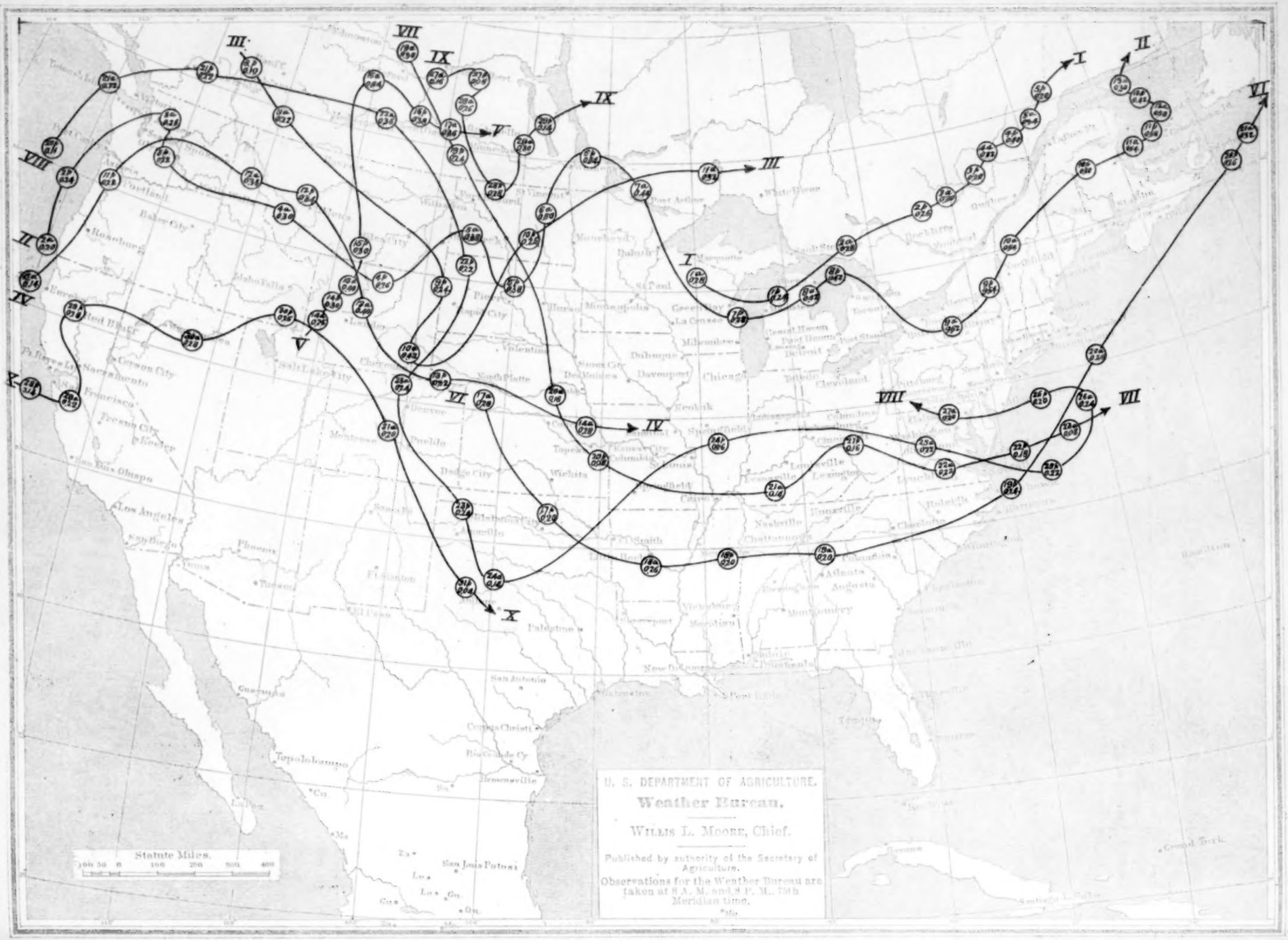


Chart II. Tracks of Centers of High Areas. October, 1896.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Weather Bureau.
WILLIS L. MOORE, Chief.
Published by authority of the Secretary of Agriculture.
Observations for the Weather Bureau are taken at 8 A. M. and 8 P. M., 75th Meridian time.
Statute Miles.
100 50 0 100 200 300 400

Chart III. Total Precipitation. October, 1896.

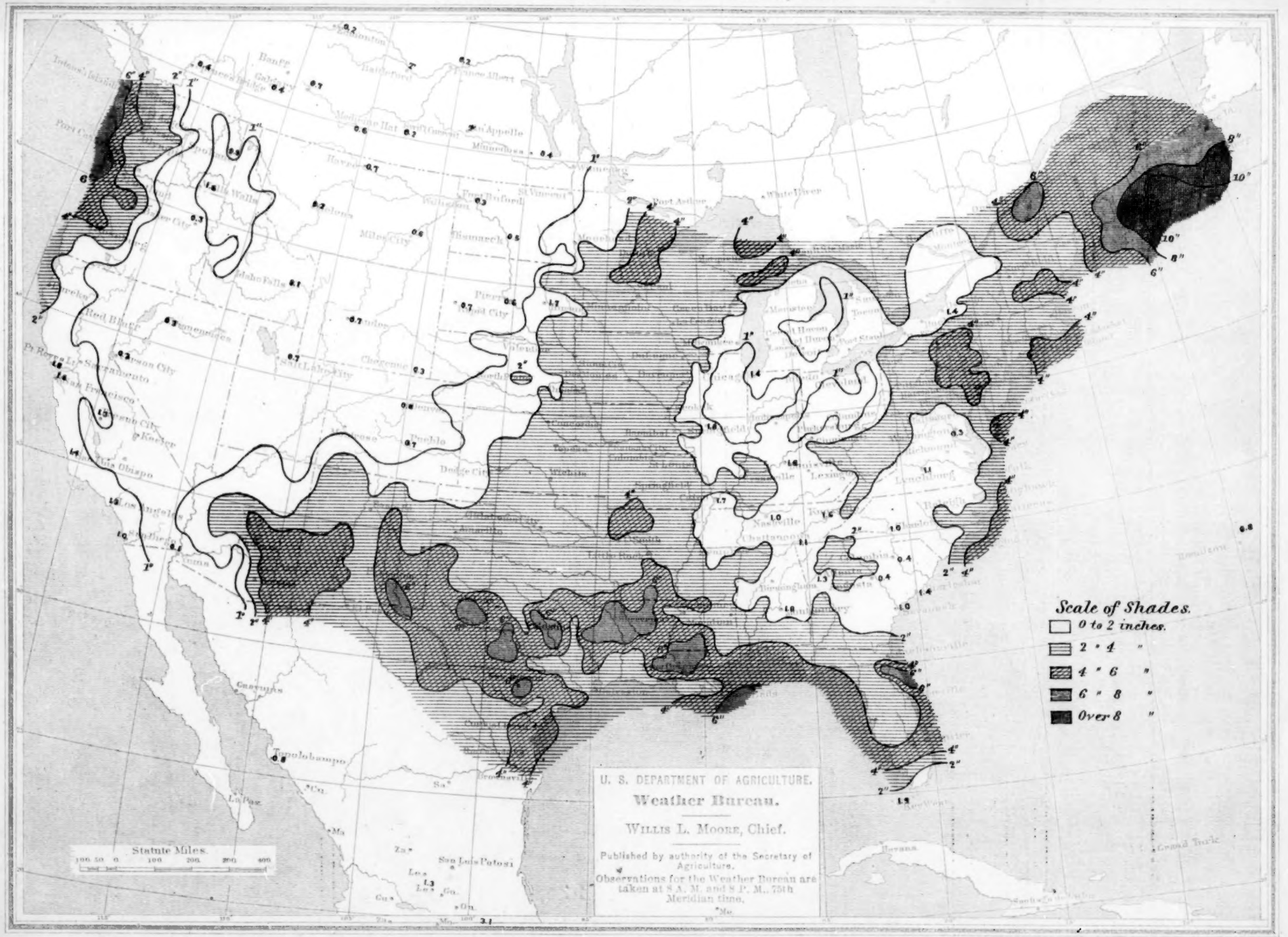
Scale of Shades.
0 to 2 inches.
2 " 4 "
4 " 6 "
6 " 8 "
Over 8 "
Statute Miles.
100 50 0 100 200 300 400
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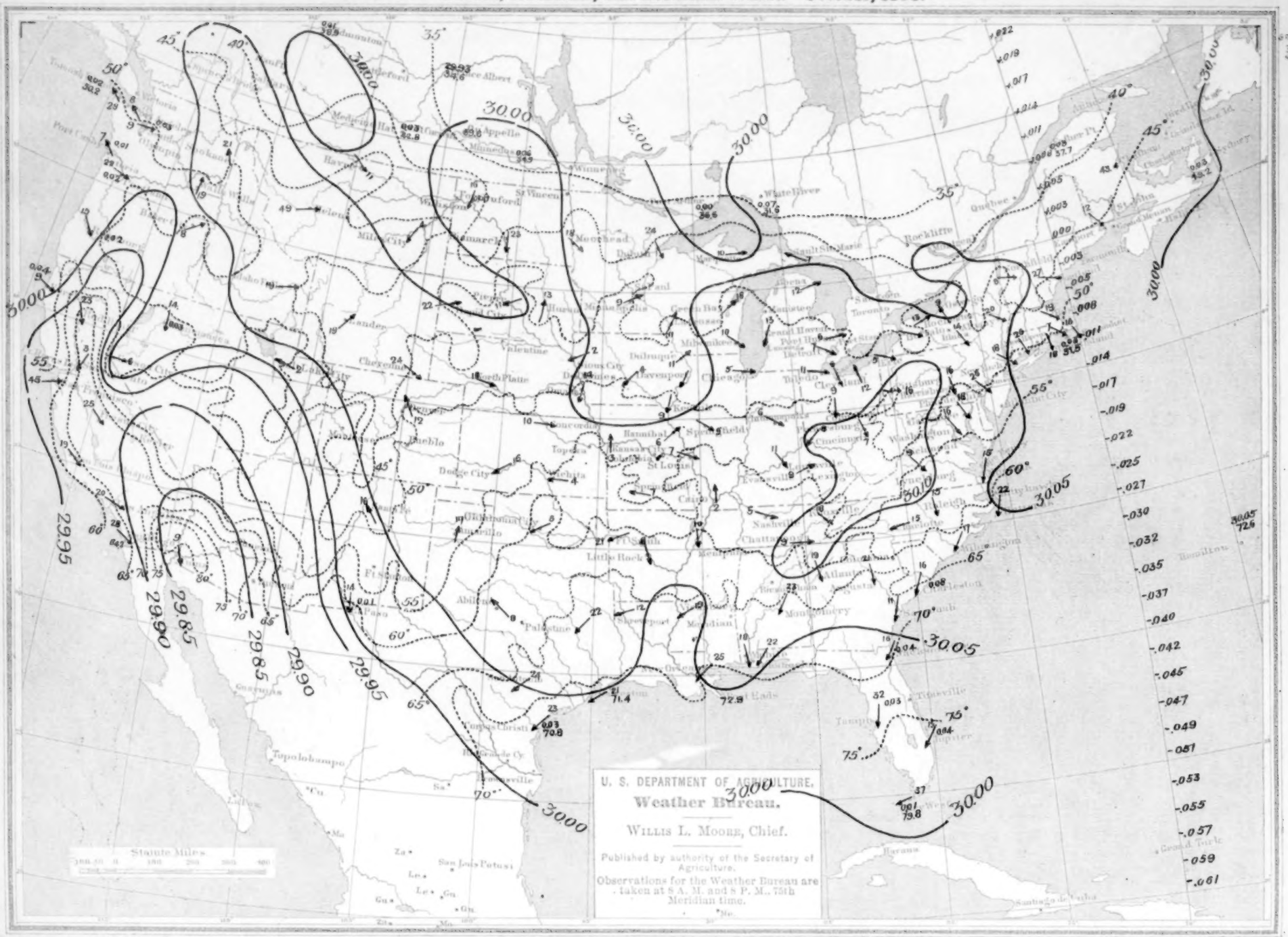
Chart IV. Isobars, Isotherms, and Resultant Winds. October, 1896.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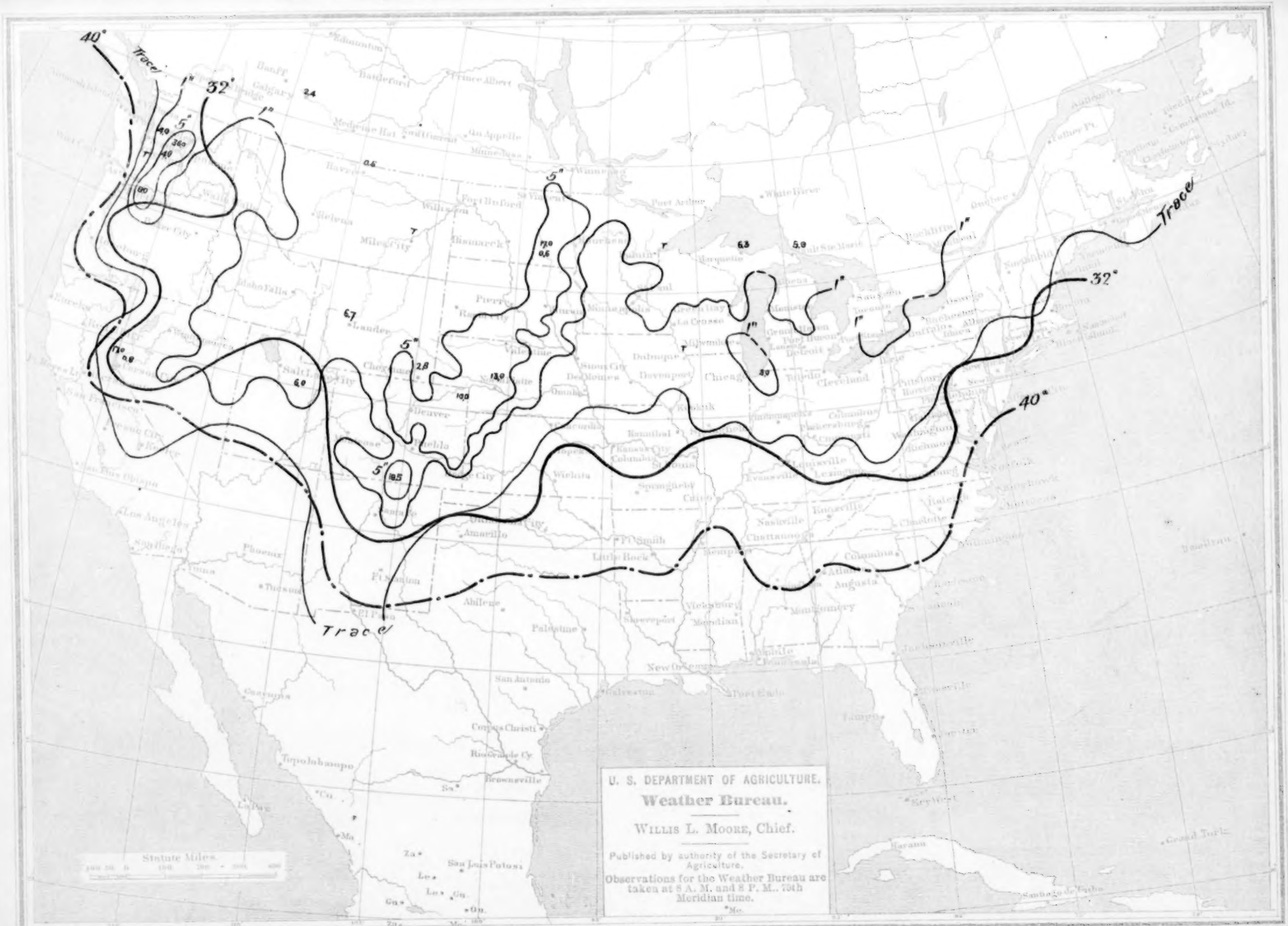
Statute Miles

Chart V. Depth of Snowfall (inches) and Limits of Freezing Weather. October, 1896.

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